GAO Sites Questionnaire

Site Name HEW Site

Agency FDEP

County Dade

Office Southeast District

Case Manager None

Completed by Jay Koch 8/2/00

1. What is the remedial status of the site (i.e. CAP, CAR, RAP)?

SE District office had no information about this site. - Paul Wierzbicki ph. (561) 681-6600

2. The most recent PA/SI report was completed on 6/24/86. Has any significant remedial work been conducted since that date?

Unknown. Site is not being tracked.

3. Has a Consent Order been signed?

Site is not being tracked.

10079029

If yes, is the Consent Order adequate for its purpose?

N/A

If yes, is the PRP complying with the Consent Order?

N/A

If no, is the PRP performing a "voluntary cleanup"?

N/A

If so, is there a formal or informal agreement with the PRP for the work being conducted? Is the work satisfactory?

N/A

4. If a Consent Order has not been negotiated, is one necessary?

N/A

5. Do you feel that additional CERCLA Site Assessment activities or NPL determination is warranted? If yes, what Priority (High or Low)?

N/A

6. Comments

SITE ASSESSMENT DECISION - EPA REGION _

Site Name: Amax Phosphate Facility EPA ID#: FLD043055151

Alias Site Names:

City: Palmetto County or Parish: Manatee State: FL

Refer to Report Dated: PA: SI: Other (report type & date): SIP 10/13/92

Report developed by: BVWST

DECISION:

|✓| 1. Further Action under Superfund (CERCLA) is not appropriate or required because:

|✓| 1a. Site Evaluation Accomplished (SEA). | | 1b. Action Deferred to: | | RCRA | | NRC

| | 2. Further Investigation Needed Under Superfund: 2a. Priority: | | Higher | | Lower

2b. Activity Type: | | PA | | SI | | ESI | | evaluate HRS score | | Other:

DISCUSSION/RATIONALE:

Sources: surface impoundments - 110 acres
area under piles - 253 acres

· Release to groundwater, no release to nearby private wells.

· No surface water intakes

· minimal targets.

Report Reviewed and Approved by: Cynthia Gurley Signature: Cynthia K. Gurley Date: 10/13/92

Site Decision Made by: Signature: Date:

EPA Form 9100-3

Final
Site Inspection Prioritization

HEW Site For
Amax Phosphate Facility
Palmetto, Manatee County, Florida

WPB/SAS
SEP 29 1992

SAM SIGNATURE
DISPOSITION
DATE REPORT ACCEPTED 10.13.92

EPA ID № FLD043055151
WasteLan No. 00634

EPA Work Assignment № 12

Prepared under Contract № 68-W9-0055

September 23, 1992

Prepared by

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

Project № 52012.065

Prepared By	Reviewed By	Approved By
Scotti Thomas for	Scotti Thomas	
Bob Gregor	Scotti Thomas	Hubert Wieland
Site Manager	Technical Reviewer	Project Manager

Final
Site Inspection Prioritization

For

Amax Phosphate Facility
Palmetto, Manatee County, Florida

EPA ID № FLD043055151
WasteLan No. 00634

EPA Work Assignment № 12

Prepared under Contract № 68-W9-0055

September 23, 1992

DATE REPORT ACCEPTED 10-13-92
DISPOSITION SEA
SAM SIGNATURE Cynthia T. Gurley

Prepared by

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

Project № 52012.065

Prepared By	Reviewed By	Approved By
Scotti Thomas for	Scotti Thomas	H Wieland
Bob Gregor	Scotti Thomas	Hubert Wieland
Site Manager	Technical Reviewer	Project Manager

Table of Contents

Page Nº

jv-ao
September 23, 1992
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List of Tables

Following Page Nº

List of Tables (continued) Following Page Nº

List of Figures Following Page Nº

Final

SITE INSPECTION PRIORITIZATION
AMAX PHOSPHATE FACILITY

Palmetto, Manatee County, Florida

EPA ID No. FLD043055151

WasteLAN No. 00634

1.0 Introduction

B&V Waste Science and Technology Corp. was tasked by the United States Environmental Protection Agency (EPA) to conduct a Site Inspection Prioritization (SIP) for the AMAX Phosphate Facility located six miles north of Palmetto in Manatee County, Florida. This study was performed under the authorization of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendment and Reauthorization Act of 1986 (SARA).

A Site Inspection was conducted at the AMAX site by Halliburton NUS Environmental Corporation in October, 1990 (Ref. 1). Additional sources of information used in this evaluation were EPA file material as well as documentation generated via telephone contacts and letters from previous studies. The SIP will quantify threats posed by the site and provide sufficient documentation in order for decisions to be made about a future course of action.

2.0 Site Description, Operational History and Waste Characteristics

2.1 Location

The AMAX Phosphate Facility Piney Point Complex site is located east of State Highway 45/US Highway 41 and north of Buckeye Road, six miles north of Palmetto, in Manatee County, Florida. The geographic coordinates of the site are latitude

27°37'24" north, and longitude 82°31'54" west (Ref. 2). The site is at an elevation of between 8 and 35 feet above mean sea level (amsl) based on the National Geodetic Vertical Datum of 1929 (Ref. 2). The site location is shown as Figure 1.

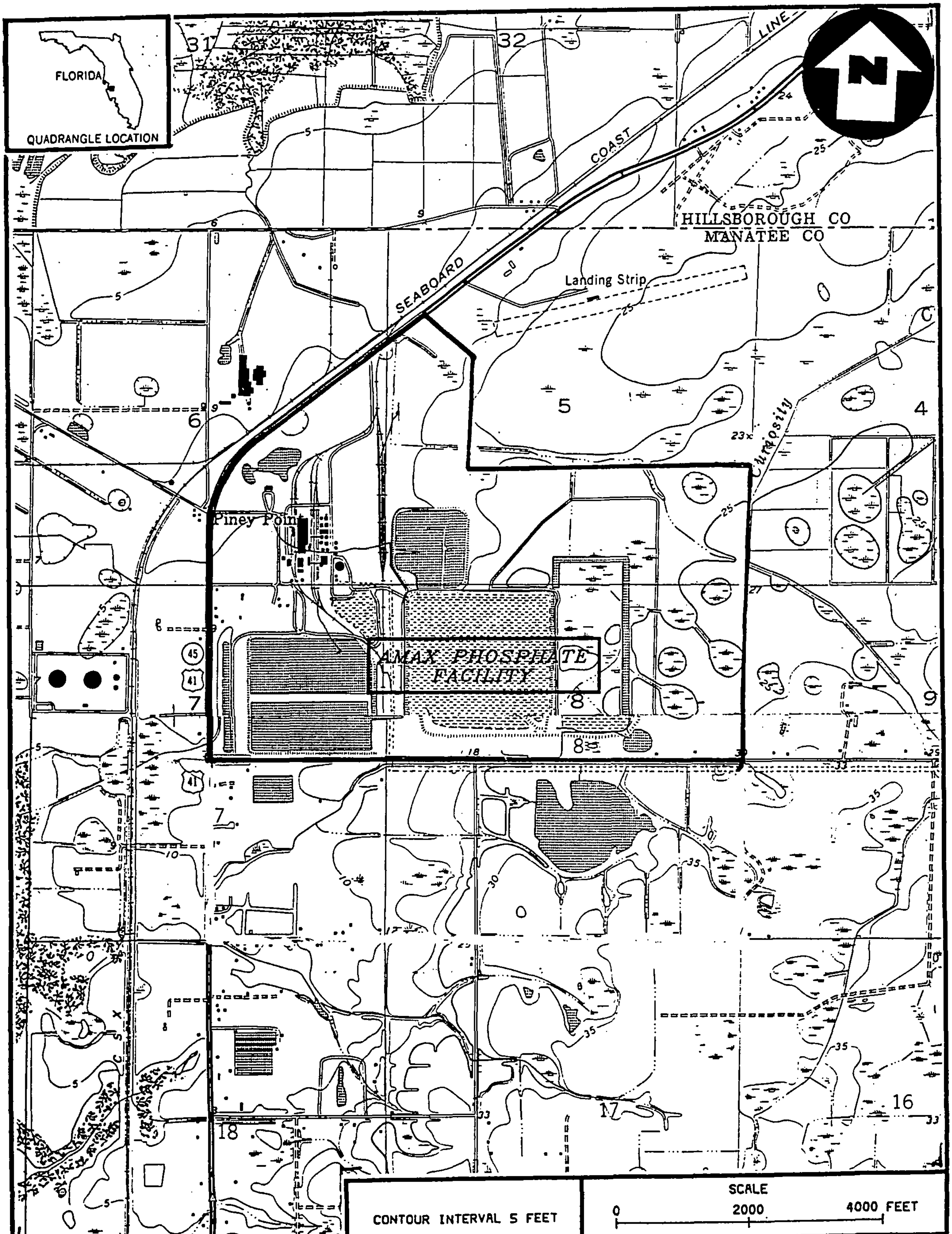
The climate in Manatee County is humid and subtropical, characterized by high mean annual rainfall and temperature. Average monthly temperatures range from 61°F in January to 82°F in July and August (Ref. 3, p. 11) with an average annual temperature of 72°F (Ref. 3, p. 105). The season with the highest rainfall extends from June through September while the remaining months of the year receive lesser amounts (Ref. 3, p. 11). The mean annual precipitation in the area is 56 inches, with a mean annual lake pan evaporation of 52 inches, yielding a net annual precipitation of 4 inches (Ref. 4). The 2-year, 24-hour rainfall is 5 inches (Ref. 5).

2.2 Site Description

The AMAX Phosphate Facility is located on approximately 670 acres and is a manufacturing facility which converts phosphate ore to phosphoric acid and diammonium phosphate (DAP). The facility also includes sulfuric acid, phosphoric acid, and ammoniated fertilizer plants along with a gypsum stack/cooling pond complex.

The AMAX Phosphate Facility is bordered on the west by US Highway 41, on the south by Buckeye Road and a citrus grove, on the east by farmland, and on the north by Manatee Airport, a landing strip (Ref. 2). The plant is fenced on the northern, eastern, and western borders with a guardhouse to the north. Access can be gained by foot on Buckeye Road at the southern border. During the site investigation, stressed vegetation was noted along the plant's borders (Ref. 1). A drainage ditch for nonprocess water on the northern border empties into Piney Point Creek and then into Tampa Bay approximately two miles west of the facility, while a drainage ditch along the southern border empties into Bishop Harbor one mile to the west, which also converges with the bay (Ref. 1). The site layout is shown as Figure 2.

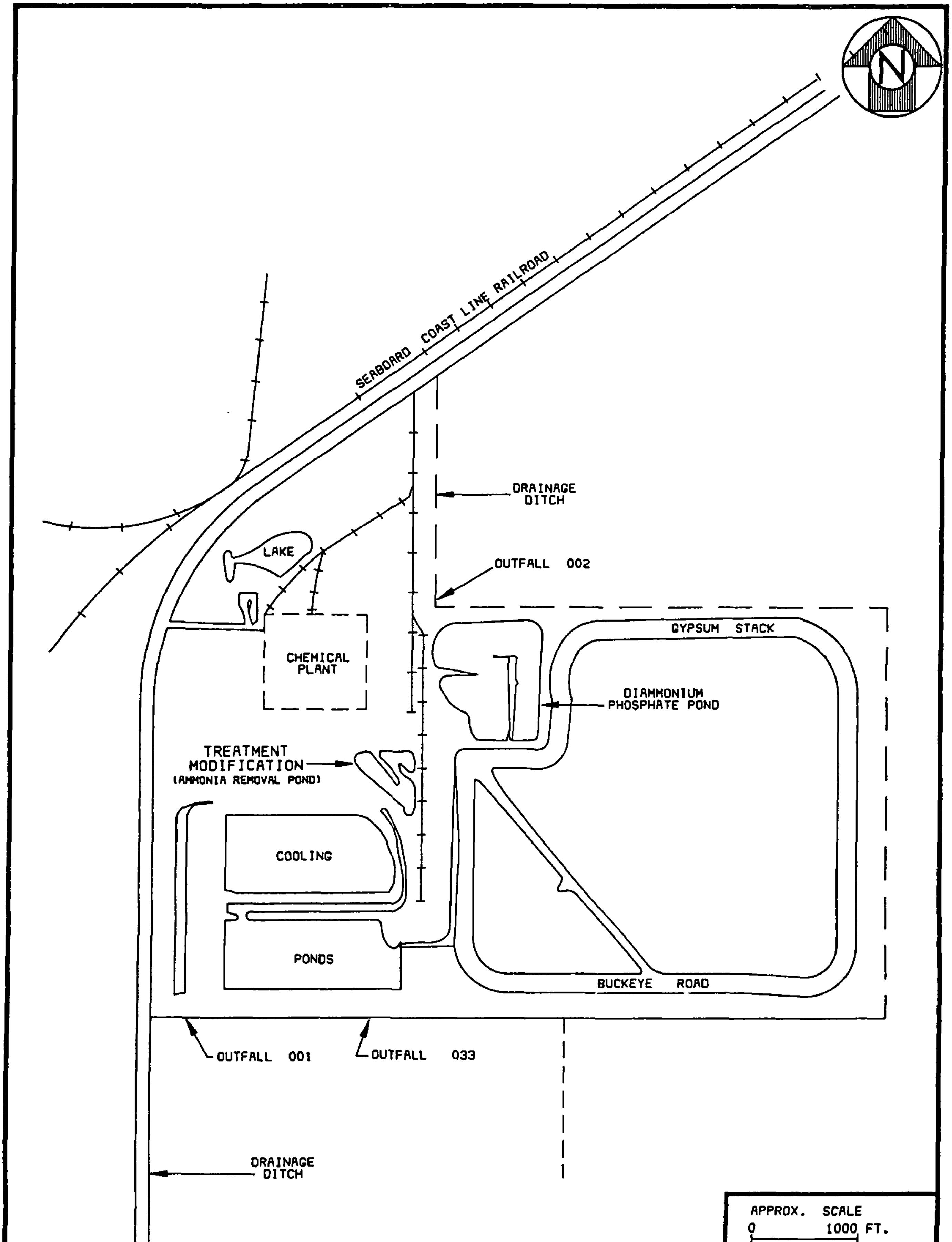
The AMAX complex consists of several parts associated with the manufacturing process. An approximately five acre manufacturing portion, located to the northwest,



BASE MAP IS A PORTION OF THE USGS 7.5 MINUTE QUADRANGLES, COCKROACH BAY, FLA. 1981 & PALMETTO, FLA. 1987.

SITE LOCATION MAP
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 1



SITE LAYOUT MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 2

consists of sulfuric acid, phosphoric acid, and DAP plants. The largest portion of the property is used for gypsum stacks, the calcium sulfate by-product from the phosphoric acid process, which occupy approximately 253 acres on the southeast. The stacks are surrounded by a drainage ditch that channels water from the stacks back to the plant and also inhibits lateral migration of leachate from the gypsum. There is also a 32-acre DAP pond in the northwest corner of the gypsum stack area, while a 77-acre cooling pond is located in the southwest corner. Additionally, there is a 1-acre ammonia removal pond northeast of the cooling pond. Process and nonprocess water, along with gypsum, are pumped to waste disposal areas on the facility, and a network of drainage ditches ultimately leads to the two ditches mentioned above. Railroad tracks, with a spur going into the plant on the northern border of the property, are located along the western border (Ref. 1).

2.3 Operational History and Waste Characteristics

AMAX began operations at the facility in 1966 and expanded in 1978 (Ref. 6, p. 7). The facility was then sold to Consolidated Minerals, Inc. of Plant City, Florida, at an unknown date, some time after February, 1987 (Refs. 6, 7). At the end of 1988, Royster Phosphates, Inc. purchased the facility from Consolidated (Ref. 8). In November 1990, Royster sold the plant to Atlantic Fertilizer Company as a joint venture with Gulf Atlantic. Royster Phosphates, however, is still responsible for the management of the facility (Ref. 9, p. 5). The site is currently active.

The main products which AMAX produces and sells are phosphoric acid and the fertilizer, DAP. To make these products, the plant first manufactures sulfuric acid which is used to digest the phosphate ore. The phosphoric acid, produced in the process, is then reacted with ammonia to yield the final product, DAP. AMAX manufactures 2,000 tons of sulfuric acid per day and purchases an additional 300 tons per day. In the manufacturing process, brink mist eliminators in towers remove escaping acid mist and sulfur oxide before they are released into the environment (Ref. 1).

Phosphate rock is crushed and slurried with sulfuric acid. The resulting slurry is filtered to remove the phosphoric acid, which is formed in the process, from the complex. The acid formed in this process is concentrated to 54 percent. Impurities are removed and shipped out of the plant in tanks. The process water from this production, with a pH of between 1.8 and 2.0, is used to transport the gypsum to the top of the stack and is recirculated to the plant. Exhaust from the production is washed with recycled water to remove harmful gases before discharge from the stack (Refs. 1, 9, 10).

In the production of DAP 18-46-0, anhydrous ammonia, phosphoric acid, and 75 percent phosphate rock are mixed together. The resulting slurry is pumped to a solid-materials handling system where the aqueous portion is removed, and the DAP is dried. Scrubbers inhibit dust and fumes from being released into the atmosphere. The final product is either used directly as fertilizer, or is processed further by other fertilizer plants (Refs. 1, 9, 10).

In the above mentioned processes, water that has come into contact with either gaseous emissions, dust, or gypsum is contaminated and cannot be released by the plant; therefore, excess water is kept in holding ponds. In order to minimize the volume of water, there is an evaporation system consisting of sprayers in the holding areas. During the rainy season when accumulation is increased, water is treated before it is released from the site. Before releasing the water, fluorides and phosphorous products are removed as solids and deposited on the gypsum stacks, and the acidic pH is neutralized with lime (Refs. 1, 9, 10).

The potential for pollution of air and water is inherent in the production of fertilizers. The impurities resulting from these manufacturing processes can inadvertently be released into the environment through several pathways and consist of a variety of substances. The plant process water characteristically has a low pH and contains a high concentration of inorganic by-products from the phosphate rock. In addition to elevated levels of radioactive particle emissions (uranium-238, radium-226), there may also be elevated concentrations of arsenic, cadmium, chromium, lead, fluoride, manganese, iron, and sulfate. A study conducted by the US Environmental Protection Agency (EPA) indicated that only radium-226, uranium-238, chromium, and arsenic were present at over one-half of the study sites in large enough quantities in phosphogypsum to exceed health-based screening limits (Ref. 11, p. 12-6, 12-7). Leachate from the plant, however, typically has a higher concentration of contaminants of concern. It was found that the following concentration of metals in leachate at the study sites provided a potential health or environmental risk if released into either groundwater or surface water: arsenic, lead, cadmium, chromium, fluoride, zinc, antimony, copper, thallium, nickel, iron, and mercury (Ref. 11, p. 12-9).

Unless the gypsum stacks and cooling ponds are underlain with an impervious liner, contaminants can be discharged to groundwater; however, the soils under the stacks can neutralize or buffer the pH, causing some contaminants to precipitate from solution, thus attenuating their migration (Refs. 6, p. 8; 12, p. 7). Also, phosphates, when released into the environment, increase algal growth in surface water which upsets the natural biological balance (Ref. 13, p. 471). Because of the low pH of the process water, some of the fluorides are converted to gaseous hydrogen fluoride and transmitted into the environment during the sprinkling involved with the evaporation process on the gypsum stacks. Fluorides have been periodically found in citrus tree foliage and grass used for cattle grazing in the area around AMAX phosphate (Ref. 9). Additionally, escaping dust and fumes from the plant's stacks can transmit airborne particulate pollutants and by-products.

The plant has been permitted by the Florida Department of Environmental Regulation (FDER) to discharge process water and nonprocess wastewater into two drainage ditches. Outfalls 001 and 003, to the south of the facility, flow into a drainage ditch which empties into Bishop Harbor, an outlet to Tampa Bay, while Outfall 002, to the north, drains into a ditch which discharges into Piney Point Creek, then into Tampa Bay. Outfalls 001 and 002 are for nonprocess water, while Outfall 003 is for treated process water. Outfall 001 was used for the last time in September 1989, and Outfall 003 was last used in March 1989. Outfall 002 is still being used. All three outfalls are still permitted (Refs. 9, 14, 15).

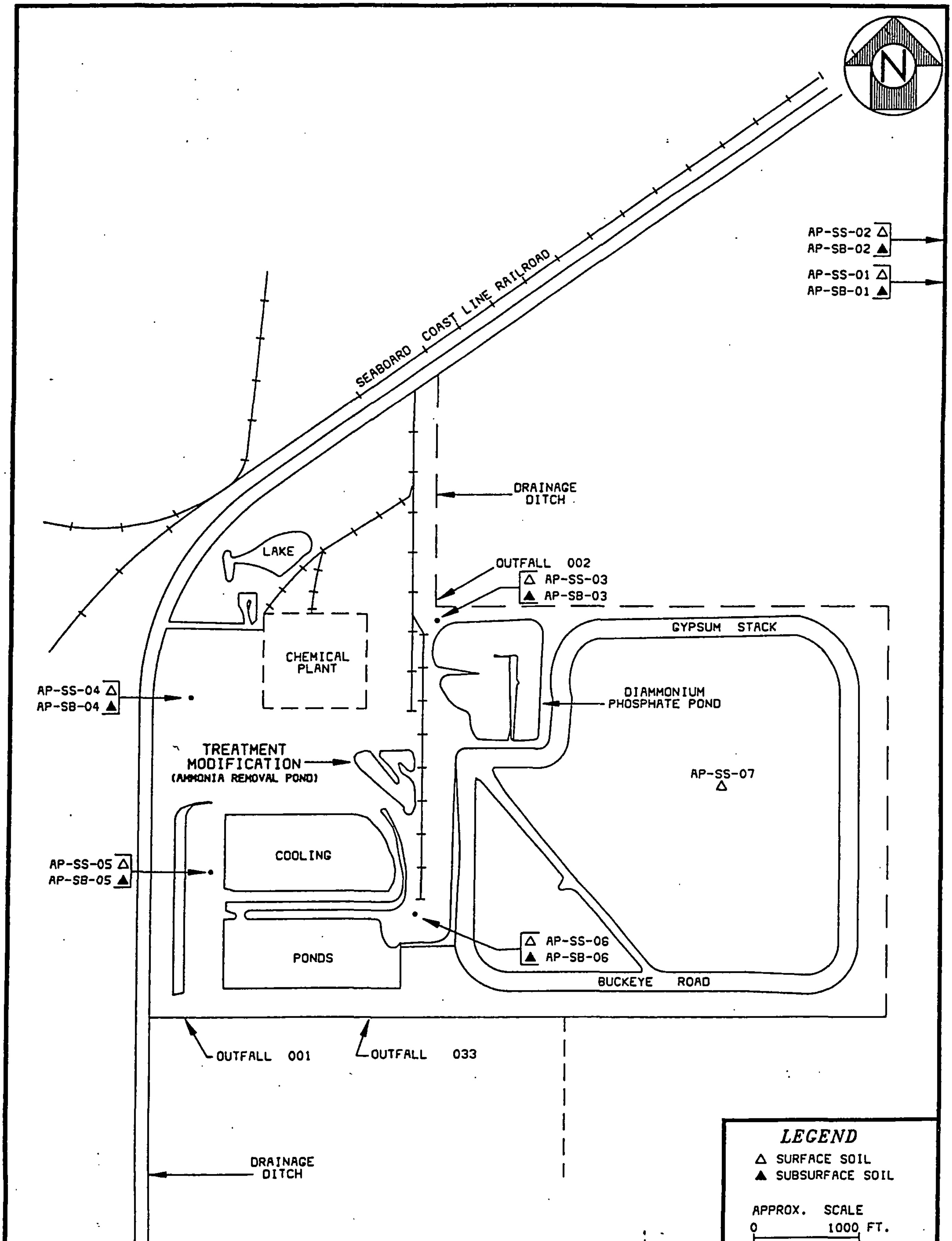
The U.S. Geological Survey conducted a study in 1982 on the effect of groundwater contamination in the area of the gypsum stacks. Arsenic, cadmium, chromium, fluoride, lead, selenium and silver were present in excess of primary drinking water standards at AMAX (Ref. 6). A groundwater monitoring plan was submitted to the FDER in September 1983, issued in September 1985, and withdrawn in October 1985. The company collected and submitted more information, and a second permit was issued in March 1987. During this monitoring program, elevated levels of sodium, sulfate, total dissolved solids (TDS), manganese, and iron were recorded (Ref. 6).

In October 1990, the Halliburton NUS Environmental Corporation Field Investigation Team (FIT) conducted a field investigation at the AMAX facility. During the sampling investigation, a total of 44 environmental samples were collected. Six surface soil, one gypsum stack, six subsurface soil, nine surface water, eleven sediment, five groundwater from temporary wells, five groundwater from existing monitoring wells and one groundwater sample from a private well were taken. Two sets of surface soil, subsurface soil, and groundwater samples, one located to the north of AMAX, the other to the east, served to establish background conditions. See Figures 3, 4 and 5 and Tables 1, 2 and 3 for sample locations.

Surface soil analytical results indicated the presence of numerous metals. Sample AP-SS-03 contained cadmium (2.6 mg/kg, 3 times MQL) and nickel (5.6 mg/kg, 3 times MQL). Sample AP-SS-05 contained barium (55 mg/kg, 5 times background), cadmium (4.4 mg/kg, 5 times MQL), chromium (29 mg/kg, 4 times background), manganese (95 mg/kg, 4 times background), and nickel (9 mg/kg, 5 times MQL). Sample AP-SS-06 contained barium (33 mg/kg, 3 times background), cadmium (3 mg/kg, 3 times MQL), chromium (42 mg/kg, 6 times background), and nickel (3.5 mg/kg, 2 times MQL). Selenium was found in sample AP-SS-04 (estimated 4.9 mg/kg, 9 times MQL). Nickel was also found in the gypsum sample, AP-SS-07 (3.9 mg/kg, 2 times MQL). No organic contaminants of concern were found in surface soil samples, and no contaminants of concern were found in the subsurface soil samples collected at this site. Soil sample analytical results are presented in Tables 4 and 5.

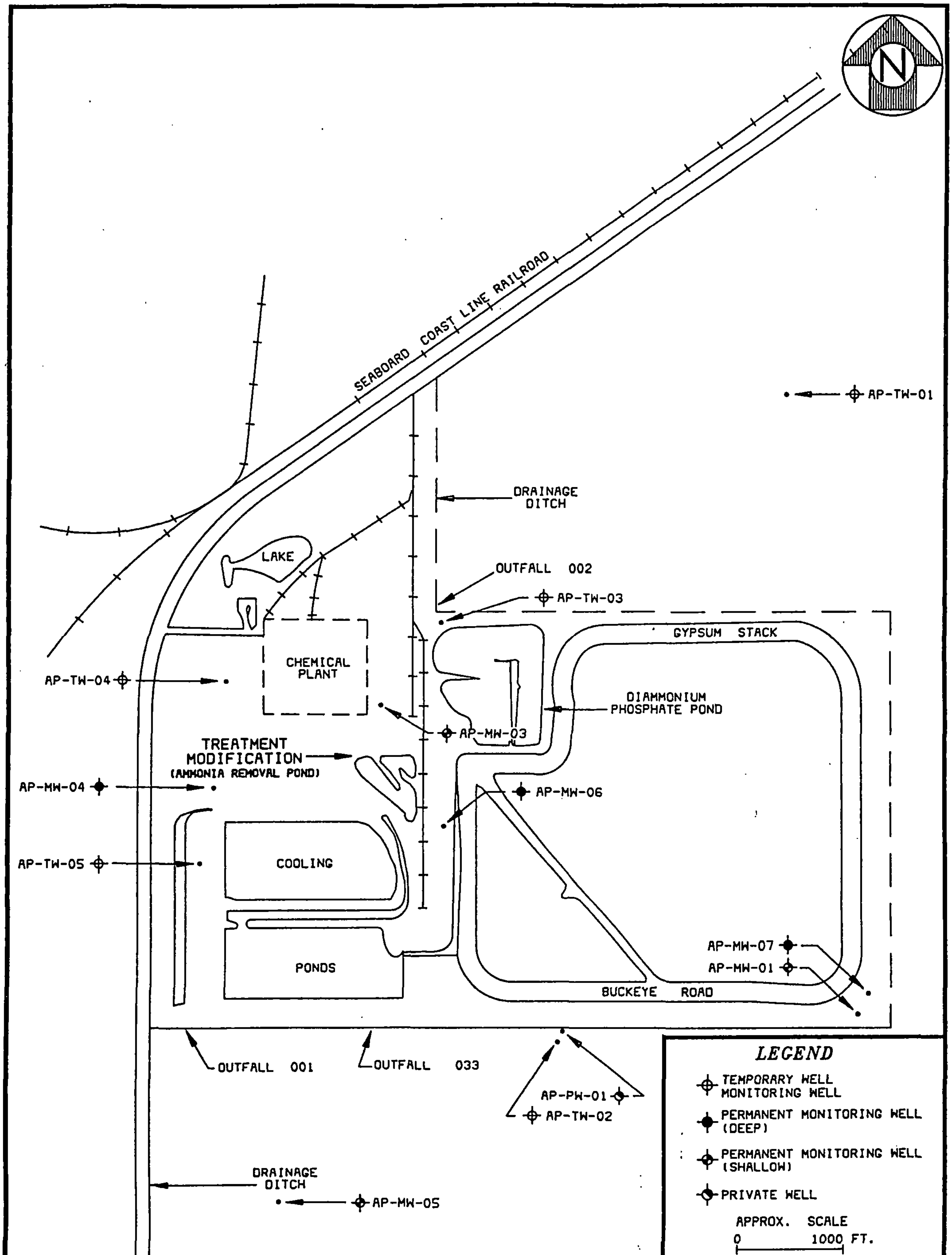
Metals found in elevated levels in groundwater sample AP-MW-01 included cadmium (18 ug/L, 6 times MQL) and manganese (220 ug/L, 3 times background). Analytical results for groundwater samples are presented in Tables 6 and 7.

Sediment samples taken from the cooling pond and the drainage ditch adjacent to the gypsum stacks both contained elevated levels of metals. Sample AP-SD-09, taken from the cooling pond, contained chromium (140 mg/kg, 7 times background) and lead (estimated 85 mg/kg, 5 times background). Sample AP-SD-12, taken from the



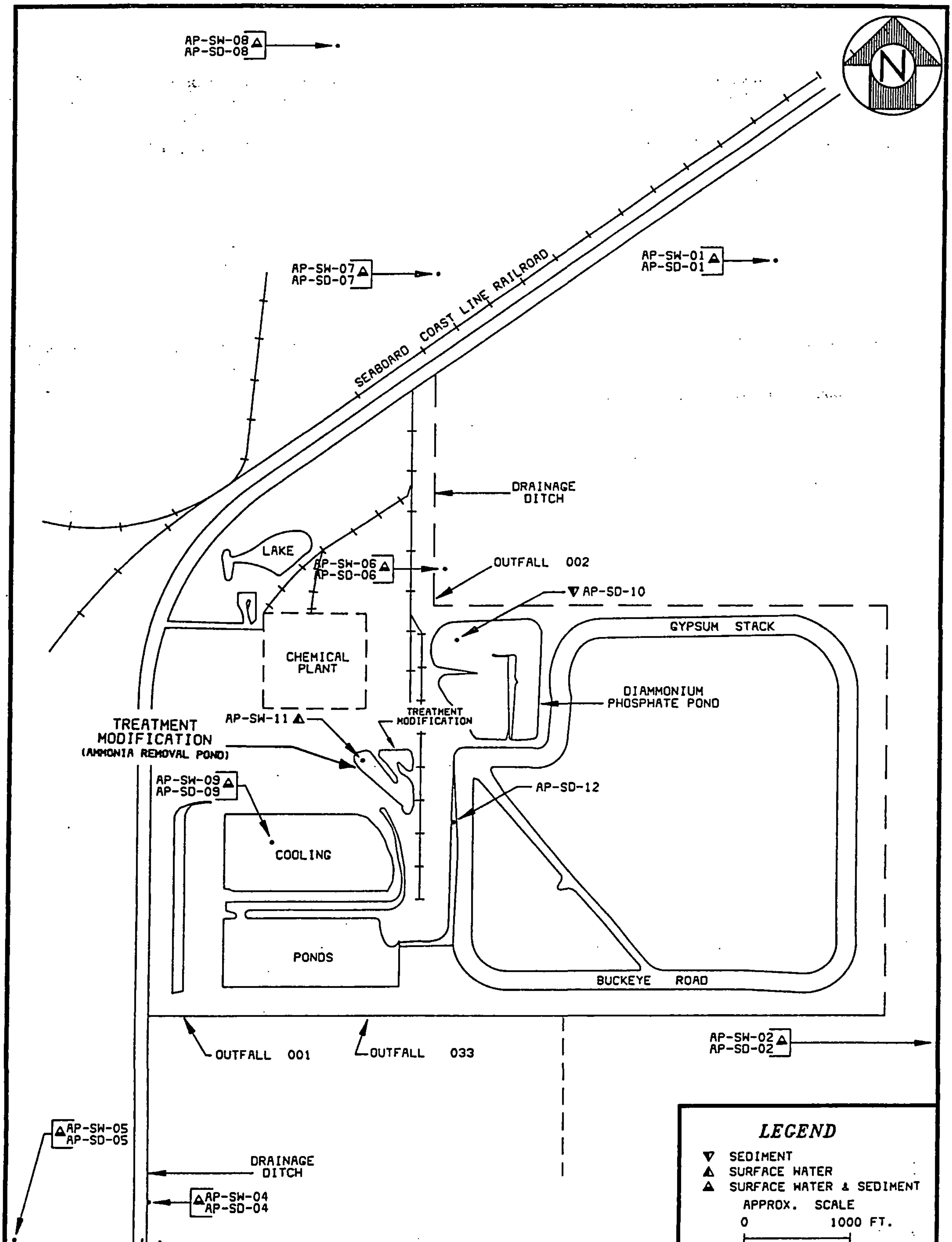
SOIL SAMPLE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 3



GROUNDWATER SAMPLE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 4



SEDIMENT AND SURFACE WATER SAMPLE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 5

TABLE 1
Sample Codes, Descriptions, Locations, and Rationale
Surface and Subsurface Soil Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

SAMPLE CODE	DESCRIPTION	LOCATION	RATIONALE
AP-SS-01	Surface Soil	West side of manatee Airport Road, 2,000 feet north of AMAX	Establish background conditions
AP-SS-02	Surface Soil	East of gypsum stacks 50 feet from AMAX	Establish background conditions
AP-SS-03	Surface Soil	West side of DAP pond, between drainage ditch and pond	Determine migration of contaminants
AP-SS-04	Surface Soil	Southwest corner of chemical plant, west of fence	Determine migration of contaminants
AP-SS-05	Surface Soil	West of cooling pond between drainage ditch and rainwater pond.	Determine migration of contaminants
AP-SS-06	Surface Soil	Between drainage ditch and cooling pond	Determine migration of contaminants
AP-SS-07	Gypsum Stack	Gypsum stacks	Characterize contaminants
AP-SB-01	Subsurface Soil	In conjunction with AP-SS-01, collected 4' bls	Establish background conditions
AP-SB-02	Subsurface Soil	In conjunction with AP-SS-02, collected 4' bls	Establish background conditions
AP-SB-03	Subsurface Soil	West DAP pond and drainage ditch, collected 8' bls	Determine migration of contaminants
AP-SB-04	Subsurface Soil	In conjunction with AP-SS-04, collected 4' bls	Determine migration of contaminants
AP-SB-05	Subsurface Soil	In conjunction with AP-SS-05, collected 10' bls	Determine migration of contaminants
AP-SB-06	Subsurface Soil	In conjunction with AP-SS-06, collected 4'bls	Determine migration of contaminants

Source: Ref. 1

Sample Codes:

AP	AMAX Phosphate Facility
SS	Surface Soil
SB	Subsurface Soil

TABLE 2
Sample Codes, Descriptions, Locations, and Rationale
Groundwater Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

SAMPLE CODE	DESCRIPTION	LOCATION	RATIONALE
AP-TW-01	Groundwater	In conjunction with AP-SS-01, collected 7' bls	Establish background conditions
AP-TW-02	Groundwater	In conjunction with AP-SS-02, collected 4' bls	Establish background conditions
AP-TW-03	Groundwater	In conjunction with AP-SS-03, collected 10' bls	Determine migration of contaminants
AP-TW-04	Groundwater	In conjunction with AP-SS-04, collected 4' bls	Determine migration of contaminants
AP-TW-05	Groundwater	In conjunction with AP-SS-05, collected 10' bls	Determine migration of contaminants
AP-MW-01*	Groundwater	Southeast corner of plant, surficial aquifer, 15.2' bls	Determine migration of contaminants
AP-MW-03	Groundwater	East of chemical plant, surficial aquifer, 21.2' bls	Determine migration of contaminants
AP-MW-04	Groundwater	North of cooling ponds, surficial aquifer, 22.6' bls	Determine migration of contaminants
AP-MW-05	Groundwater	South of Buckeye Road, surficial aquifer, 15.2' bls	Determine migration of contaminants
AP-MW-06	Groundwater	West of gypsum stack drainage ditch, intermediate aquifer, 65.5' bls	Determine migration of contaminants
AP-PW-01	Groundwater	West of gypsum stacks, 50 feet east of AMAX	Determine migration of contaminants

Source: Ref. 1

Sample Codes:

AP	AMAX Phosphate Facility
MW	Groundwater, Monitoring Well
PW	Private Well
TW	Groundwater, Temporary Well
*	AP-MW-02 was not collected

pm/SH
September 24, 1992
A:\JUL92\AMAX\TABLE2

TABLE 3
Sample Codes, Descriptions, Locations, and Rationale
Surface Water and Sediment Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

SAMPLE CODE	DESCRIPTION	LOCATION	RATIONALE
AP-SW-01	Surface Water	Little Manatee River 5 miles north of AMAX	Establish background conditions
AP-SW	Surface Water	Cabbage Slough Creek 1.5 miles east of AMAX	Establish background conditions
AP-SW-04	Surface Water	Southwest corner of AMAX in drainage ditch downgradient from Outfalls 001 and 003	*Determine migration of contaminants*
AP-SW-05	Surface Water	Confluence of drainage ditch and Bishop Creek	Determine migration of contami
AP-SW-06	Surface Water	Drainage ditch downgradient from Outfall 002	Determine migration of contami
AP-SW-07	Surface Water	Drainage ditch downgradient from Outfall 002, east of Highway 41	Determine migration of contaminants
AP-SW-08	Surface Water	Piney Point Creek, 20 feet north of County Line Road	Determine migration of contaminants
AP-SW	Surface Water	East end of cooling pond	Characterize contaminants
AP-SW-11	Surface Water	West end of ammonia removal pond	Characterize contaminants
AP-SD-01	Sediment	In conjunction with AP-SW-01	Establish background conditions
AP-SD-02*	Sediment	In conjunction with AP-SW-02	Establish background conditions
AP-SD-04	Sediment	In conjunction with AP-SW-04	Determine migration of contami
AP-SD-05	Sediment	In conjunction with AP-SW-05	Determine migration of contami
AP-SD-06	Sediment	In conjunction with AP-SW-06	Determine migration of contami
AP-SD-07	Sediment	In conjunction with AP-SW-07	Determine migration of contami
AP-SD-08	Sediment	In conjunction with AP-SW-08	Determine migration of contami
AP-SD-09	Sediment	In conjunction with AP-SW-09	Characterize contaminants
AP-SD-10	Sediment	DAP pond by waste inlet	Characterize contaminants
AP-SD-11	Sediment	In conjunction with AP-SW-11	Characterize contaminants
AP-SD-12	Sediment	Drainage ditch west of gypsum stacks	Determine migration of contami

Source: Ref. 1

Sample Codes:

AP	AMAX Phosphate Facility
SD	Sediment
PW	Surface Water
*	AP-SW-03, AP-SW-10 and AP-SD-03 were not collected

pm/SH
September 24, 1992
A:\JUL92\AMAX\TABLE3

TABLE 4
Summary of Organic Analytical Results
Surface and Subsurface Soil Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (ug/kg)	BACKGROUND		ON SITE				GYPSUM	BACKGROUND		ON SITE			
	AP-SS-01	AP-SS-02	AP-SS-03	AP-SS-04	AP-SS-05	AP-SS-06	AP-SS-07	AP-SB-01	AP-SB-02	AP-SB-03	AP-SB-04	AP-SB-05	AP-SB-06
PURGEABLE COMPOUNDS													
Toluene	2J	2J	–	6J	1J	1J	–	6U	6U	–	–	–	3J
EXTRACTABLE COMPOUNDS													
Phenol	890U	720U	–	–	–	–	480J	–	–	–	–	–	–
Di-N-Butylphthalate	890U	720U	–	–	120J	–	–	–	–	–	–	–	–
Unidentified Compounds/No.(1)	8000J/5	3000J/2	8000J/6	3000J/2	5000J/4	2000J/2	1000J/1		800J/1	2000J/2			1000J/1
Petroleum Product(1)		N			N								
Dodecanoic Acid(1)							2000JN						
Hexadecanoic Acid(1)							4000JN						
PESTICIDE\PCB COMPOUNDS													
4,4'-DDE(P,P'-DDE)	43U	39	–	–	–	–	–	–	–	–	–	–	–
4,4'-DDT(P-P'-DDT)	43U	39	–	–	–	–	–	–	–	–	–	–	–
Gamma-Chlordane	220U	45J	–	–	–	–	–	–	–	–	–	–	–
Alpha-Chlordane	220U	52J	–	–	–	–	–	–	–	–	–	–	–

– Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
Shaded cells denote elevated concentrations of contaminants either three times greater than background, or greater than or equal to MQL.

pm/SH
August 4, 1992
A:\JUL92\AMAX\TABLE4

TABLE 5
Summary of Inorganic Analytical Results
Surface and Subsurface Soil Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (mg/kg)	BACKGROUND		ON SITE				GYPSUM	BACKGROUND		ON SITE			
	AP-SS-01	AP-SS-02	AP-SS-03	AP-SS-04	AP-SS-05	AP-SS-06	AP-SS-07	AP-SB-01	AP-SB-02	AP-SB-03	AP-SB-04	AP-SB-05	AP-SB-06
Aluminum	1600	200	4600	1300	6000	8300	1100	4500	1100	2900	1100	1700	3100
Barium	11	3U	30	13	55	33	30	20	3U	11	5.3	5.6	18
Cadmium	0.83U	0.63U	2.6	–	4.4	3	–	0.73U	0.69U	–	–	–	–
Calcium	45,000	2100	96,000	9200	190,000	88,000	150,000	1900	130U	42,000	600	6700	63,000
Chromium	4.9	6.8	18	–	29	42	11	7.9	1.4U	6.6	–	4.1	5.2
Cobalt	1.1U	0.84U	–	–	2.4	1.5	–	–	–	–	–	–	–
Iron	1500J	300J	5200J	2600J	4300J	7000J	1800J	4300J	800J	2700J	460	700J	2500J
Lead	7.1J	50J	9.5J	–	19J	25J	8.9J	4.3J	1J	1.8J	1.4J	1.3J	3.3J
Magnesium	4500	180	220	260	1100	2700	190	240	30U	280	–	–	390
Manganese	24	19	10	–	95	14	25	–	–	–	–	–	–
Nickel	1.7U	1.3U	5.6	–	9	3.5	3.9	–	–	–	–	–	–
Potassium	160U	30U	420	–	860	820	–	–	–	–	–	–	–
Selenium	0.55UR	0.42UR	–	4.9	–	–	–	–	–	–	–	–	–
Sodium	280U	30U	1800	–	2600	2900	960	60U	30U	390	–	–	540
Vanadium	5U	1U	36	–	56	42	13	6U	1U	13	–	–	–

– Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
U Material was analyzed for but not detected. The number given is the MQL.
R Quality Control indicates that data is unusable. Compound may or may not be present.
Shaded cells denote elevated concentrations of contaminants either three times greater than background, or greater than or equal to MQL.

pm/SH
July 20, 1992
A:\JUL92\AMAX\TABLE5

TABLE 6
Summary of Organic Analytical Results
Groundwater Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (ug/l)	BACKGROUND		ON SITE			ON SITE MONITORING WELLS					PRIVATE WELL	TRIP BLANK
	AP-TW-01	AP-TW-02	AP-TW-03	AP-TW-04	AP-TW-05	AP-MW-01*	AP-MW-03	AP-MW-04	AP-MW-05	AP-MW-06	AP-PW-01	AP-PB-01
PURGEABLE COMPOUNDS												
Carbon Disulfide	5U	5U	–	–	–	–	–	14	–	130	–	–
Acetaldehyde[1]												6JN
EXTRACTABLE COMPOUNDS												
Benzoic Acid	50U	42J	–	–	–	–	–	–	–	–	–	–
Bis(2-Ethylhexyl)Phthalate	10U	10U	–	–	–	–	–	76	–	–	–	–
Diethylmethylbenzamide[1]						10JN						
Butylidenebisdimethylethylmethylphenol[1]							20JN	20JN	10JN			
Octanoic Acid[1]							5JN		6JN			
Caprolactam[1]								100JN		70JN		
Unidentified Compounds/N[a][1]								20J/1	100J/3			
Decanoic Acid[1]									5JN			
Bis(Hydroxylethyl)Dodecanamide[1]									30JN			
Tetramethylbutane[1]					7JN							

– Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-MW-02 was not collected.
Shaded cells denote elevated concentrations of contaminants either three times greater than background, or greater than or equal to MQL.

pm/SH
July 17, 1992
A:\JUL92\AMAX\TABLE6

TABLE 7
Summary of Inorganic Analytical Results
Groundwater Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (ug/l)	BACKGROUND		ON SITE			ON SITE MONITORING WELLS					PRIVATE WELL	TRIP BLANK
	AP-TW-01	AP-TW-02	AP-TW-03	AP-TW-04	AP-TW-05	AP-MW-01*	AP-MW-03	AP-MW-04	AP-MW-05	AP-MW-06	AP-PW-01	AP-PB-01
Aluminum	36,000	260,000	7300	20,000	5600	3400	750	–	1610	–	–	–
Arsenic	14	53	18	56	–	–	30J	–	–	–	–	–
Barium	110	460	53	210	130	–	120	–	52	–	–	–
Beryllium	2U	6	–	–	–	–	–	–	–	–	–	–
Cadmium	3U	3U	–	–	–	–	18	–	–	–	–	–
Calcium	91,000	21,000	600,000	320,000	470,000	81,000	380,000	140,000	270,000	75,000	83,000	–
Chromium	78	190	12	38	13	–	–	–	9	–	–	–
Cobalt	7	32	–	9	–	–	–	–	–	–	–	–
Iron	26,000J	170,000J	27,000J	25,000J	2300J	3300J	10,000J	1300J	3200J	–	–	–
Lead	18	44	–	12	5	5	–	–	–	8	–	–
Magnesium	20,000	9300	36,000	25,000	39,000	37,000	16,000	16,000	61,000	22,000	40,000	–
Manganese	70U	70	–	39	–	73	220	–	–	–	–	–
Nickel	18	89	–	14	–	–	–	–	–	–	–	–
Potassium	29,000	2900	23,000	8000	30,000	4000	9100	2600	9300	6400	3700	–
Sodium	28,000	2200	7000	120,000	55,0000	75,000	350,000	36,000	61,000	29,000	55,000	–
Vanadium	74	170	–	–	130	–	–	–	–	–	–	–
Zinc	60UJ	130J	–	–	–	–	–	–	–	–	–	–

– Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
* AP-MW-02 was not collected.
Shaded cells denote elevated concentrations of contaminants either three times greater than background, or greater than or equal to MQL.

pm/SH
July 20, 1992
A:\JUL92\AMAX\TABLE7

lead (estimated 85 mg/kg, 5 times background). Sample AP-SD-12, taken from the drainage ditch, contained barium (8 mg/kg, 4 times MQL), chromium (76 mg/kg, 4 times background), cobalt (3.4 mg/kg, above MQL), and lead (estimated 59 mg/kg, 4 times background). Cobalt was also found in sample AP-SD-11 (3.9 mg/kg, above MQL). Analytical results for sediment samples are presented in Tables 8 and 9.

Surface water sample AP-SW-09, taken from the cooling pond, contained elevated levels of the following metals: beryllium (23 ug/L, 23 times MQL), cadmium (130 ug/L, 43 times MQL), chromium (360 ug/L, 13 times background), cobalt (210 ug/L, 52 times MQL), manganese (4100 ug/L, 37 times background) nickel (690 ug/L, 86 times MQL), and zinc (estimated 1400 ug/L, 11 times MQL). Arsenic was found in sample AP-SW-11 (49 ug/L, 6 times MQL). Cyanide was found in two samples taken from the southern drainage pathway: sample AP-SW-07 contained 14 ug/L (above MQL), and sample AP-SW-08 contained 100 ug/L (10 times MQL). Surface water analytical results are presented in Tables 10 and 11.

Radium-226, radium-228, and gross alpha analyses were performed on selected soil, sediment, surface water, and groundwater samples. On-site sample AP-SS-06 contained elevated levels of radium-226 (8.12 pCi/g, 9 times background). The gypsum sample, AP-SS-07, contained radium-226 (16.5 pCi/g, 18 times background) and radium-228 (8.10 pCi/g, 14 times background). Elevated levels of radium-226 were also found along the southern drainage pathway in Sample AP-SD-12 (7.36 pCi/g, 8 times background). Surface water taken from the same location, AP-SW-12, contained radium-226 (1.85 pCi/L, 3 times background). Radionuclide analytical results are summarized in Tables 12 and 13.

3.0 Groundwater Pathway

3.1 Hydrogeologic Setting

The AMAX Phosphate Facility is located in the Gulf Lowlands subdivision of the Atlantic (Gulf) Coastal Plain physiographic province and the southeast coastal plain hydrogeologic setting in northwest Manatee County, Florida (Ref. 3, p. 105). The major soil types in the area of the facility include the Palmetto, Wabasso, Eau Gallie,

TABLE 8
Summary of Organic Analytical Results -- Sediment Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (ug/kg)	BACKGROUND		SOUTHERN DRAINAGE PATHWAY		NORTHERN DRAINAGE PATHWAY			ON SITE			
	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
PURGEABLE COMPOUNDS											
Acetone	13U	31U	–	–	26	–	–	37	–	–	–
Carbon Disulfide	6U	10J	–	–	–	–	–	–	–	–	–
Trimethylbicycloheptane(1)						30JN					
Methyl(Methylethyl)Benzene(1)						200JN					
Unidentified Compounds/Na(1)						20J/1					
EXTRACTABLE COMPOUNDS											
Phenol	840U	2100*							10,000		
Benzoic Acid	4100U	10,000U	–	–	–	–	–	–	690J	–	–
Acenaphthene	840U	2100U	–	–	–	140J	–	–	–	–	–
Phenanthrene	580J	2100U	–	750J	–	760J	–	–	–	–	–
Anthracene	140J	2100U	–	–	–	190J	–	–	–	–	–
Di-N-Butylphthalate	840U	2100U	–	–	–	–	–	–	–	150J	–
Fluoranthene	1400	2100U	–	–	–	3200	–	–	–	–	–
Pyrene	750J	2100U	–	720U	–	1600	–	–	–	–	–
Benzylbutylphthalate	840U	2100U	–	–	–	–	210J	–	–	–	–
Benzo(A)Anthracene	330J	2100U	–	120J	–	490J	–	–	–	–	–
Chrysene	500J	2100U	–	420J	–	710J	–	–	–	–	–
Bis(2-Ethylhexyl)Phthalate	840U	2100U	–	–	–	–	–	–	–	–	–
Benzo(B and/or K)Fluoranthene	440J	2100U	–	270J	–	470J	–	–	–	–	–
Benzo(A)Pyrene	380J	2100U	–	210J	–	350J	–	–	–	–	–
Indeno(1,2,3-CD)Pyrene	220J	2100U	–	–	–	140J	–	–	–	–	–
Benzo(GHI)Perylene	210J	2100U	–	–	–	–	–	–	–	–	–
Unidentified Compounds/Na	2000J/2	50,000J/15	2000J/1	3000J/3	–	20,000J/5	20,000J/7	5000J/2	30,000J/4	50,000J/17	3000J/2
Petroleum Product(1)		N				N				N	
Dodecanoic Acid(1)								1000JN	20,000JN		
Hexadecanoic Acid(1)	600JN	1000JN				500JN					1000JN
Anthracenedione(1)	300JN										
Benzofluorene(1)	300JN					300JN					
Benzofluoranthene(Not B or K)(1)	200JN										
Benzacephenanthrylene(1)	500JN										
Tetrahydrodimethyl(Methyethyl)Naphthalene(1)						2000JN	500JN				
Naphthalenol(1)						1000JN					
Heptadecanoic Acid(1)								400JN			
Octadecanoic Acid(1)								800JN	4000JN		
Phenylethanone(1)									3000JN		
Tetradecanoic Acid(1)									700JN		
Phenyltricyclononadienol(1)									2000JN		
Diphenylpropanedione(1)									6000JN		
PESTICIDE/PCB COMPOUNDS											
PCB-1248(AROCLOR 1248)	200U	500U	–	–	–	–	350	–	–	–	–

– Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. this compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-SD-03 was not collected.
Shaded cells denote elevated concentrations of contaminants either three times greater than background, or greater than or equal to MQL.

pm/SH
July 17, 1992
A:\JUL92\AMAX\TABLE8

TABLE 9
Summary of Inorganic Analytical Results
Sediment Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (mg/kg)	BACKGROUND		SOUTHERN DRAINAGE PATHWAY		NORTHERN DRAINAGE PATHWAY			ON SITE			
	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
Aluminum	380	10,000	530	1300	1100	1000	950	21,000	4400	300	12,000
Barium	2U	80	19	7.5	5.2	13	13	110	72	16	64
Cadmium	0.71U	1.9U	–	–	–	–	–	2.6	–	–	8
Calcium	1400	38,000	2000	3100	8400	27,000	7200	200,000	210,000	220,000	110,000
Chromium	1.4U	20	–	2.8	2.4	6.1	6.6	140	24	7.1	76
Cobalt	0.95U	3U	–	–	–	–	–	2.7	–	3.9	3.4
Copper	9UJ	62J	–	–	–	–	–	–	–	–	–
Iron	440J	11,000J	830J	1600J	9000J	6400J	2100J	45,000J	12,000J	390J	18,000J
Lead	2.8J	16J	1.1J	74J	1.7J	11J	15J	85J	26J	2.1J	59J
Magnesium	200	2500	82	1100	170	200	520	2000	510	4500	9900
Manganese	2U	63	–	–	26	22	–	26	–	44	40
Nickel	1.4U	6.7	–	–	2.3	2.7	–	–	4.2	17	7.6
Potassium	60U	270U	–	–	–	–	–	2000	550	–	1600
Sodium	350U	290U	–	2900	–	–	–	12000	3900	2800	6700
Vanadium	1U	20U	–	–	–	–	–	140	24	–	130

– Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
* AP-SD-03 was not collected.
Shaded cells denote elevated concentrations of contaminants either three times greater than background, or greater than or equal to MQL.

pm/SH
July 20, 1992
A:\JUL92\AMAX\TABLE9

TABLE 10
Summary of Organic Analytical Results
Surface Water Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (ug/l)	BACKGROUND		NORTHERN DRAINAGE PATHWAY		SOUTHERN DRAINAGE PATHWAY			ON SITE	
	AP-SW-01	AP-SW-02*	AP-SW-04	AP-SW-05	AP-SW-06	AP-SW-07	AP-SW-08	AP-SW-09*	AP-SW-11
PURGEABLE COMPOUNDS									
Carbon Disulfide	5U	5U	–	–	5	–	–	–	4J
Tetramethylbutane(1)									8JN
EXTRACTABLE COMPOUNDS									
Unidentified Compounds/N#(1)					100J/3			60J/4	
Bromacil(1)			4JN				4JN		
Hexadecanoic Acid(1)								10JN	10JN
Hydroxymethoxybenzaldehyde(1)								5JN	
Petroleum Product(1)								N	
Tetradecanoic Acid(1)									7JN
PESTICIDES/PCBs									
Endosulfan Sulfate	0.24	–	–	–	–	–	–	–	–

– Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-SW-03 and AP-SW-10 were not collected.
Shaded cells denote elevated concentrations of contaminants either three times greater than background, or greater than or equal to MQL.

pm/SH
July 20, 1992
A:\JUL92\AMAX\TABLE10

TABLE 11
Summary of Inorganic Analytical Results
Surface Water Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (ug/l)	BACKGROUND		NORTHERN DRAINAGE PATHWAY		SOUTHERN DRAINAGE PATHWAY			ON SITE	
	AP-SW-01	AP-SW-02*	AP-SW-04	AP-SW-05	AP-SW-06	AP-SW-07	AP-SW-08	AP-SW-09*	AP-SW-11
Aluminum	340U	16,000	–	–	–	–	–	27,000	–
Arsenic	5U	8U	–	–	–	–	–	–	49
Barium	20U	120	–	29	–	–	–	63	–
Beryllium	1U	1U	–	–	–	–	–	23	–
Cadmium	3U	3U	–	–	–	–	–	130	–
Calcium	61,000	170,000	160,000	160,000	150,000	180,000	160,000	670,000	170,000
Chromium	6U	28	–	–	–	–	–	360	–
Cobalt	4U	4U	–	–	–	–	–	210	–
Iron	350UJ	14,000J	–	–	–	–	–	29,000J	–
Lead	5	14	–	–	–	–	–	35	–
Magnesium	140,000	46,000	58,000	220,000	66,000	59,000	42,000	200,000	49,000
Manganese	20U	110	–	–	–	–	52	4100	–
Nickel	6U	8U	–	–	–	–	–	690	–
Potassium	47,000	13,000	16,000	68,000	3700	5300	6800	160,000	89,000
Sodium	1,100,000	68,000	110,000	1,500,000	42,000	100,000	69,000	1,200,000	650,000
Thallium	10UR	10UR	–	–	–	–	–	13J	–
Vanadium	4U	30U	–	–	–	–	–	820	–
Zinc	40UJ	130UJ	–	–	–	–	–	1400J	–
Cyanide	10U	10U	–	–	–	14	100	–	–

– Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
* AP-SW-03 and AP-SW-10 were not collected.
Shaded cells denote elevated concentrations of contaminants either three times greater than background, or greater than or equal to MQL.

pm/SH
July 16, 1992
A:\JUL92\AMAX\TABLE11

TABLE 12
Summary of Radionuclide Concentrations
Soil Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (pCi/g)(1)	BACKGROUND AP-SS-01	ON SITE AP-SS-06	GYPSUM AP-SS-07	BACKGROUND AP-SD-01	NORTHERN AP-SD-06	SOUTHERN AP-SD-12
Radium-226	0.89 ± 5.00%	8.12 ± 1.00%	16.5 ± 1.0%	0.36 ± 7.00%	0.76 ± 5.00%	7.36 ± 1.00%
Radium-228	0.56 ± 153%	0.49 ± 186%	8.10 ± 17.0%	0.85 ± 115%	0.38 ± 256%	0.73 ± 128%

(1) Results are for dry soil.

Shaded cells denoted elevated concentrations of radiation, three times greater than background levels.

pm/SH
July 17, 1992
A:\JUL92\AMAX\TABLE12

TABLE 13
Summary of Radionuclide Concentrations
Water Samples
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

PARAMETERS (pCi/l)	BACKGROUND AP-TW-01	MONITORING WELLS AP-MW-03	MONITORING WELLS AP-MW-06	BACKGROUND AP-SW-01	SOUTHERN DRAINAGE AP-SW-12
Radium-226	7.32 ± 2.00%	16.4 ± 1.00%	1.13 ± 3.00%	0.54 ± 4.00%	1.85 ± 2.00%
Radium-228	2.43 ± 87.5%	1.76 ± 64.6%	0.53 ± 81.0%	0.53 ± 85.8%	0.29 ± 182%
Gross Alpha	53.8 ± 21.6%	44.6 ± 42.4%	1.75 ± 169%	5.04 ± 235%	5.30 ± 83.3%

Shaded cells denoted elevated concentrtions of radiation, three times greater than background levels.

pm/SH
July 17, 1992
A:\JUL92\AMAX\TABLE13

and Bradenton fine sands and the Chobee loamy fine sand which are slow to moderately permeable soils that are poorly drained (Ref. 16).

The facility is underlain by Miocene to Recent undifferentiated surficial sands, sandy limestone, and shells whose composition may vary laterally and vertically. These undifferentiated surficial deposits range between approximately 1 to 35 feet thick, and comprise the unconfined surficial aquifer system (Refs. 3, p. 129; 17, p. 62). The average depth to the water table in the area of the facility ranges between 4 and 10 feet below land surface (bls) (Ref. 9). The water table forms a subdued replica of the topographic surface in the area. Seasonal fluctuations of water levels in the surficial aquifer are generally less than 10 feet and are very dependent upon the availability of water (Ref. 3, p. 29). The vertical hydraulic conductivities of the surficial aquifer range from 4.2×10^{-10} to 4.6×10^{-3} centimeters/second (cm/s) (Ref. 3, p. 35).

The Miocene Hawthorne Group underlies the surficial aquifer system. The Hawthorne Group is located between 1 to 35 feet bls and ranges between 350 and 400 feet thick in the area below the AMAX facility (Refs. 3, p. 129; 17, p. 62). The Arcadia Formation and the Tampa Member of the Arcadia Formation comprise the Hawthorne Group in the area of the facility (Ref. 17, p. 62). The Arcadia Formation consists of limestone and dolostone containing varying amounts of quartz sand, clay, and phosphate grains. Sand and clay lenses are interspersed irregularly throughout the formation. The Arcadia Formation is approximately 220 feet thick in the area of the facility (Ref. 17, p. 62).

The Tampa Member of the Arcadia Formation is composed primarily of limestone with minor dolomite, sands, and clays. The Tampa Member is approximately 135 feet thick in the area of the facility. Sand and clay lenses also appear occasionally within the Tampa Member.

The Hawthorne Group acts as an upper confining unit for the underlying Floridan Aquifer System. The rocks that comprise the upper confining unit vary greatly in lithology and are complexly interbedded.

The Oligocene Suwanee Limestone underlies the Hawthorne group. The Suwanee Limestone is composed of hard, yellow to creamy, fossiliferous limestones. The upper part of the Suwanee Limestone contains thin, discontinuous chert lenses; the basal portion is interbedded with quartz sand and dolomite. The Suwanee Limestone ranges up to approximately 300 feet thick (Refs. 3, p. 28; 12, pp. B-32,B-33).

The Eocene Ocala Limestone underlies the Suwanee Limestone. The Ocala Limestone consists of the Crystal River Member, the Williston Member, and the Inglis Member. All three members consist of cream to fossiliferous limestone interbedded with chert beds. The Inglis Member of the Ocala Limestone often contains gray to brown dolomite. The Ocala Limestone ranges between 300 and 600 feet thick (Refs. 3, p. 28; 12, p. B-30).

The Eocene Avon Park Formation underlies the Ocala Limestone. The Avon Park Formation consists of brown fossiliferous limestone. The upper portion of the Avon Park Formation occasionally contains layers of carbonaceous material or peat, and the basal portion may contain evaporite lenses. The Avon Park Formation may be greater than 1,000 feet thick (Refs. 3, p. 28; 18, pp. B-25,B-27).

The Lower Eocene Oldsmar Formation underlies the Avon Park Formation. The Oldsmar Formation consists of micritic to finely pellital limestone thinly interbedded with fine to medium crystalline, vuggy dolomite. The basal portion of the formation is usually more extensively dolomitized than the upper portion and contains pore-filling gypsum deposits and thin beds of anhydride. The Oldsmar Formation and other lower Eocene carbonate rocks are approximately 1,500 feet thick (Ref. 18, p. B-28).

The Floridan Aquifer System is a vertically continuous sequence of carbonate rocks of generally high permeability that ranges from late Paleocene to early Miocene age. Less permeable carbonate rocks separate the aquifer system into the Upper and Lower Floridan aquifers (Ref. 18, p. B-45). The Upper Floridan aquifer is composed of the lower portion of the Tampa Member of the Arcadia Formation (Hawthorne Group), the Suwanee Limestone, the Ocala Limestone, and the Avon Park Formation (Ref. 18, pp. B-45, B-47). The top of the Floridan aquifer ranges from 357 to 400 feet bls in the area of the facility (Ref. 17, p. 62). The Upper Floridan aquifer is approximately 1,250 feet thick. The base of the Upper Floridan aquifer is located at approximately -1,650 amsl. The Avon Park Formation is the deepest potable, water-bearing formation in the Upper Floridan aquifer (Ref. 3, p. 28).

3.2 Groundwater Targets

Within a four mile radius of the AMAX facility, the majority of the population in Manatee county obtain potable water from the Manatee County Water Department. The water department obtains its water from Lake Manatee which is not on the surface water migration pathway. The residents of Hillsborough County receive water from either private or community wells (Refs. 9, 19, 20, 21). A house count using topographic maps indicates that there are 312 residences within 4 miles of the site using water obtained from private wells. Assuming there are 2.51 persons per residence in Hillsborough County, there are approximately 783 persons using private wells (Refs. 2, 22). The nearest private well is located approximately 0.43 mile north of the facility (Ref. 2). The vast majority of these wells are completed in the surficial aquifer. Groundwater is also used for irrigation of farms and groves (Ref. 19).

3.3 Groundwater Conclusions

Because numerous people obtain their potable water from wells located near the site, the groundwater pathway may warrant some concern. However, the latest sampling has not shown any contamination in nearby private wells.

4.0 Surface Water Pathway

4.1 Hydrologic Setting

Surface water runoff from the facility is directed into a ditch system surrounding the waste source areas. These ditches, which accept process and nonprocess water, eventually drain into two canals, one to the north and one to the south, running parallel to Buckeye Road. Formerly, two outfalls, 001 and 003 for nonprocess and process water respectively, emptied approximately one mile southwest into the later canal. This canal also receives drainage from the agricultural land to the west. This canal flows east under US Highway 41 for about 2,000 feet where it converges with a railroad canal. This canal enters a creek leading to Bishop Harbor one mile west of the site, and Bishop Harbor flows into Tampa Bay one mile downstream of this point. Outfall 002, currently in use, handles nonprocess water and enters a canal on the northern side of the site. This canal also flows west under US Highway 41 and into Piney Point Creek 2,500 feet from the AMAX facility. The creek converges with Tampa Bay two miles to the northwest of the facility (Ref. 1). In addition, the area surrounding the plant is composed of a large number of wetlands which may accept drainage from the site. Eventually, these wetlands drain into small creeks that either flow towards Tampa Bay to the west, or the Little Manatee River five miles to the north (Ref. 2). This river also drains into Tampa Bay. The AMAX facility is located in the 100 year floodplain (Ref. 23).

4.2 Surface Water Targets

The Manatee County Water Department obtains water from Lake Manatee, which is not on the surface water migration pathway. The remainder of the people obtain potable water from private or community wells. There are no intakes along the surface water migration pathway (Ref. 9).

As was mention in Section 4.1, the area surrounding the plant is composed of a large number of wetland areas. There are at least eight miles of wetlands frontage along the surface water pathway (Ref. 2). The federally endangered Florida manatee (Trichechus manatus) is often sighted in the Little Manatee River. A critical habitat for this species is located 6.5 miles from the plant (Ref. 11, p. 12-17). The Mississippi sandhill crane which is also a federally endangered species, uses the Tampa Bay area as a habitat. People often fish in Bishop's Creek which accepts runoff from the canal south of the AMAX facility. Bishop's Harbor is often used for recreational fishing. The Tampa Bay area supports additional recreational activities such as boating and swimming (Ref. 9).

4.3 Surface Water Conclusions

During flooding, the migration of contaminants from the site to the surface water system would be enhanced due to the site being in the 100 year floodplain and the presence of the drainage ditches located to the north and south of the facility. Bishop's Creek and Bishop's Harbor, located 0.25 mile and 1.0 mile from the site respectively, are fisheries within the 15-mile surface water pathway. The Mississippi sandhill crane, a federally endangered species, uses Tampa Bay, located about 2 miles east of the site, as habitat.

5.0 Soil Exposure and Air Pathways

5.1 Physical Conditions

The area to the west of AMAX is predominantly industrial with Port Manatee 1.5 miles to the west. There is a landing strip, Manatee Airport, directly to the north. The area immediately to the south consists of a citrus grove. To the west there is a cattle ranch and turf farm. The area surrounding the facility is also composed of a large concentration of wetlands. The AMAX facility is located on approximately 670 acres and includes sulfuric acid, phosphoric acid, and ammonia fertilizer plants as well as a gypsum stack/cooling pond complex. During the investigation by Halliburton NUS, stressed vegetation was present along the plant's borders. Large volumes of smoke were also seen emitting from the plants stacks (Ref. 24).

5.2 Soil and Air Targets

The closest neighbors to the AMAX facility are located in four trailers approximately 50 feet to the east of the gypsum stacks. The total population within a four mile radius is 3,893 with the following distribution: 69 people between 0 and 0.25 mile, 58 people between 0.25 and 0.50 mile, 200 people between 0.50 and 1 mile, 699 people between 1 and 2 miles, 221 people between 2 and 3 miles, and 2,666 people between 3 and 4 miles (Refs. 2, 22, 25). There are no schools within four miles of the facility (Refs. 2, 25). There are approximately 15 acres of wetlands onsite and another 50 acres within 0.5 mile of the site (Ref. 2). There are no recorded terrestrial federally endangered species within 4-mile radius of the site (Ref. 11).

5.3 Soil Exposure and Air Pathway Conclusions

The majority of the facility is fenced. However, the southern boundary is not fenced, and there are people living only 50 feet from the gypsum stacks. Therefore, there is some possibility for contaminants to spread.

6.0 Summary and Conclusions

The AMAX Phosphate Facility was assessed to identify potential threats posed to human health and the environment and to determine the need for additional investigation. There are approximately 783 potential groundwater users within four miles of the site; however, no contamination has been detected in samples from nearby private wells. There are also several miles of wetlands along the surface water pathway, as well as the occurrence of federally endangered species. Because there has been no observed release to the surface water pathway, these targets are only subject to potential contamination. From the information gathered in the study, no further action is recommended for the AMAX Phosphate Facility Site.

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CONFIDENTIAL
Hazard Ranking System Preliminary Score
AMAX PHOSPHATE FACILITY
Palmetto, Manatee County, Florida

This preliminary score was calculated using the HRS rule and the November 6, 1991 Draft SI Worksheets. The groundwater, surface water, soil exposure, and air migration pathways were evaluated using data from a sampling inspection conducted by the Halliburton NUS Corporation during the Weeks of October 16, 1990. Table 4 through 13 in the Site Inspection Prioritization (SIP) report summarize the analytical results.

A hazardous waste quantity of 1,000,000 was assigned using the total area of the surface impoundments (110 acres) and the area under the gypsum piles (253 acres).

The groundwater pathway score contributes significantly to the site score. There was an observed release to groundwater, as documented by sampling of onsite monitoring wells. There was no observed contamination of nearby private wells.

The surface water pathway provides a moderate contribution to the overall score. There are no surface water intakes along this pathway, there are several miles of wetlands and federally endangered species along the pathway. There is also recreational fishing. No observed releases have been documented in this pathway, and dilution weights farther reduce the score.

Surface soil samples taken onsite document contaminated soil onsite at the AMAX Phosphate Facility. Access to most of the site is restricted, and the nearby population is low. Therefore, this pathway is of minor concern.

The air pathway is also of little concern. The nearest individual is approximately 50 feet from the gypsum stacks, and the 20 points assigned for "nearest individual" provide the greatest contribution to this score.

HRS SCORE SUMMARY

Pathway	Score
Groundwater	38.67
Surface Water	19.14
Soil Exposure	8.67
Air	13.56
Overall Score	**23.03**

Based on the above information, no further action is recommended for this site.

Site Name: AMAX Phosphate Facility

Location: Palmetto, Manatee County, Florida

GROUND WATER MIGRATION PATHWAY SCORESHEET

FACTOR CATEGORIES AND FACTORS

	Likelihood of Release to an Aquifer	Maximum Value	Value Assigned	
1.	Observed Release	550	550	
2.	Potential to Release			
	2a. Containment	10	10	
	2b. Net Precipitation	10	3	
	2c. Depth to Aquifer	5	5	
	2d. Travel Time	35	35	
	2e. Potential to Release [lines 2a x (2b + 2c + 2d)]	500	430	
	Likelihood of Release (higher of lines 1 and 2e)	550		550
	Waste Characteristics			
4.	Toxicity/Mobility	a	100	
5.	Hazardous Waste Quantity	a	10^8	
6.	Waste Characteristics	100		100
	Targets			
7.	Nearest Well	50	20	
8.	Population			
	8a. Level I Concentrations	b	0	
	8b. Level II Concentrations	b	0	
	8c. Potential Contamination	b	33	
	8d. Population (lines 8a + 8b + 8c)	b	33	
9.	Resources	5	5	
10.	Wellhead Protection Area	20	0	
11.	Targets (lines 7 + 8d + 9 + 10)	b		58
	Ground Water Migration Score for an Aquifer			
12.	Aquifer Score [(lines 3 x 6 x 11)/82,500][c]	100		
	Ground Water Migration Pathway Score			
13.	Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)[c]	100		38.67

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

Site Name: AMAX Phosphate Facility

Location: Palmetto, Manatee County, Florida

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned	
DRINKING WATER THREAT			
Likelihood of Release			
1. Observed Release	550	0	
2. Potential Release by Overland Flow			
2a. Containment	10	10	
2b. Runoff	25	3	
2c. Distance to Surface Water	25	20	
2d. Potential to Release by Overland Flow [lines 2a x (2b + 2c)]	500	230	
3. Potential to Release by Flood			
3a. Containment (Flood)	10	10	
3b. Flood Frequency	50	25	
3c. Potential to Release by Flood (lines 3a x 3b)	500	250	
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	480	
5. Likelihood of Release (higher of lines 1 and 4)	550		480
Waste Characteristics			
6. Toxicity/Presistence	a	10,000	
7. Hazardous Waste Quantity	a	10^6	
8. Waste Characteristics	100		100
Targets			
9. Nearest Intake	50	0	
10. Population			
10a. Level I Concentrations	b	0	
10b. Level II Concentrations	b	0	
10c. Potential Contamination	b	0	
10d. Population (lines 10a + 10b + 10c)	b	0	
11. Resources	5	5	
12. Targets (lines 9 + 10d + 11)	b		5
Drinking Water Threat Score			
13. Drinking Water Threat Score [(lines 5 x 8 x 12)/82,500, subject to a maximum of 100)	100		2.91

Site Name: AMAX Phosphate Facility

Location: Palmetto, Manatee County, Florida

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
(continued)

Factor Categories and Factors	Maximum Value	Value Assigned	
HUMAN FOOD CHAIN THREAT			
Likelihood of Release			
14. Likelihood of Release (same value as line 5)	550		480
Waste Characteristics			
15. Toxicity/Persistence/Bioaccumulation	a	5×10^8	
16. Hazardous Waste Quantity	a	10^6	
17. Waste Characteristics	1,000		1000
Targets			
18. Food Chain Individual	50	2	
19. Population			
19a. Level I Concentrations	b	0	
19b. Level II Concentrations	b	0	
19c. Potential Human Food Chain Contamination	b	0.03	
19d. Population (lines 19a + 19b + 19c)	b	2.03	
20. Targets (lines 18 + 19d)			2.03
Human Food Chain Threat Score			
21. Human Food Chain Threat Score [(lines 14 x 17 x 20)/82,5000, subject to a maximum of 100)	100		11.81
ENVIRONMENTAL THREAT			
Likelihood of Release			
22. Likelihood of Release (same value as line 5)	550		480

Site Name: AMAX Phosphate Facility

Location: Palmetto, Manatee County, Florida

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
(continued)

Factor Categories and Factors	Maximum Value	Value Assigned	
ENVIRONMENTAL THREAT, (concluded)			
Waste Characteristics			
23. Ecosystem Toxicity/Persistence/Bioaccumulation	a	5×10^8	
24. Hazardous Waste Quantity	a	10^6	
25. Waste Characteristics	1,000		1000
26. Sensitive Environments			
26a. Level I Concentrations	b	0	
26b. Level II Concentrations	b	0	
26c. Potential Contamination	b	0.76	
26d. Sensitive Environments (lines 26a + 26b + 26c)	b	0.76	
Targets			
27. Targets (value from line 26d)			0.76
Environmental Threat Score			
28. Environmental Threat Score [(lines 22 x 25 x 27)/82,500, subject to a maximum of 60]	60		4.42
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED			
29. Watershed Score[c] (lines 13 + 21 + 28, subject to a miximum of 100)	100		16.23
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE			
30. Component Score (S_{of})[c] (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)	100		19.14

a Maximum value applies to waste characteristics category.
b Maximum value not applicable.
c Do not round to nearest integer.

Site Name: AMAX Phosphate Facility

Location: Palmetto, Manatee County, Florida

SOIL EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned	
RESIDENT POPULATION THREAT			
Likelihood of Exposure			
1. Likelihood of Exposure	550		550
Waste Characteristics			
2. Toxicity	a	10,000	
3. Hazardous Waste Quantity	a	10^6	
4. Waste Characteristics	100		100
Targets			
5. Resident Individual	50	0	
6. Resident Population			
6a. Level I Concentrations	b	0	
6b. Level II Concentrations	b	0	
6c. Resident Population (lines 6a + 6b)	b	0	
7. Workers	15	10	
8. Resources	5	0	
9. Terrestrial Sensitive Environments	c	0	
10. Targets (lines 5 + 6c + 7 + 8 + 9)	b		10
Resident Population Threat Score			
11. Resident Population Threat (lines 1 x 4 x 10)/82,500	b		6.67
NEARBY POPULATION THREAT			
Likelihood of Exposure			
12. Attractiveness/Accessibility	100	5	
13. Area of Contamination	100	100	
14. Likelihood of Exposure	500		50
Waste Characteristics			
15. Toxicity	a	10^4	
16. Hazardous Waste Quantity	a	10^6	
17. Waste Characteristics	100		100

Site Name: AMAX Phosphate Facility

Location: Palmetto, Manatee County, Florida

SOIL EXPOSURE PATHWAY SCORESHEET
(contiued)

Factor Categories and Factors	Maximum Value	Value Assigned	
NEARBY POPULATION THREAT, (continued)			
Targets			
18. Nearby Individual	1	1	
19. Population Within 1 Mile	b	2.7	
20. Targets (lines 18 +19)	b		3.7
Nearby Population Threat Score			
21. Nearby Population Threat (lines 14 x 17 x 20)	b		0.22
SOIL EXPOSURE PATHWAY SCORE		Nearby Population Threat: (Default Value)	2
22. Soil Exposure Pathway Score[d] (S_s), (lines [11 + 21] subject to a maximum of 100)	100		8.67

a Maximum value applies to waste characteristics category.
b Maximum value not applicable.
c No specific maximum value applies to factor. However pathway score based solely on sensitive environments is limited to maximum of 60.
d Do not round to nearest integer.

Site Name: AMAX Phosphate Facility

Location: Palmetto, Manatee County, Florida

AIR MIGRATION PATHWAY SCORESHEET

FACTOR CATEGORIES AND FACTORS

Likelihood of Release	Maximum Value	Value Assigned	
1. Observed Release	550	0	
2. Potential to Release			
2a. Gas Potential to Release	500	190	
2b. Particulate Potential to Release	500	340	
2c. Potential to Release (higher of lines 2a and 2b)	500	340	
3. Likelihood of Release (higher of lines 1 and 2c)	a		340
Waste Characteristics			
4. Toxicity/Mobility	a	1000	
5. Hazardous Waste Quantity	a	10^6	
6. Waste Characteristics	100		100
Targets			
7. Nearest Individual	50	20	
8. Population			
8a. Level I Concentrations	b	0	
8b. Level II Concentrations	b	0	
8c. Potential Contamination	b	5	
8d. Population (lines 8a + 8b + 8c)	b	5	
9. Resources	5	5	
10. Sensitive Environments			
10a. Actual Contamination	c	0	
10b. Potential Contamination	c	2.9	
10c. Sensitive Environments (lines 10a + 10b)	c	2.9	
11. Targets (lines 7 + 8d + 9 + 10c)	b		32.9
Air Migration Pathway Score			
12. Pathway Score (S_a) [(lines 3 x 6 x 11)/82,500][d]	100		13.56

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] No specific maximum value applies to factor. However pathway score based solely on sensitive environments is limited to maximum of 60.
[d] Do not round to nearest integer.

REFERENCE 1

Accepted - 7/1/91
D. Fayfield
further action

FINAL REPORT

SITE INSPECTION
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA
EPA ID #: FLD043055151

Prepared Under
TDD No. F4-9009-01
Contract No. 68-01-7346

Revision 0

FOR THE

WASTE MANAGEMENT DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

JUNE 24, 1991

HALLIBURTON NUS ENVIRONMENTAL CORPORATION
SUPERFUND DIVISION

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NOTICE

TABLE OF CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

The AMAX Phosphate Facility is located on approximately 670 acres, 6 miles north of Palmetto, Manatee County, Florida. Operations began at this facility in 1966. Currently, it is owned and operated by Royster Phosphates, Inc. Phosphate ore is transported to the facility, where it is converted to phosphoric acid and diammonium phosphate. Along with a gypsum/cooling pond complex, AMAX consists of sulfuric acid, phosphoric acid, and ammoniated fertilizer plants.

The potential for pollution of air and water are inherent in the production and use of fertilizers. The plant's process water has a low pH with a high concentration of inorganic by-products. In addition to high levels of radioactive particle emissions (including mostly uranium-236, uranium-238, radium-226), there are also elevated concentrations of arsenic, cadmium, chromium, lead, sodium, fluoride, manganese, iron, sulfate, and total dissolved particles. Also, air contamination from escaping dust and fumes from the plant's stacks can transmit airborne particulate pollutants and by-products. Additionally, the low pH of the process water causes the reaction of acid with fluoride impurities to produce gaseous hydrogen fluoride.

AMAX Phosphate is located in the Gulf Central Lowlands subdivision of the Atlantic (Gulf) Coastal Plain physiographic province and the southeast coastal plain hydrogeologic setting in northwest Manatee County, Florida. The facility is underlain by Miocene to Recent undifferentiated surficial sands, sandy limestone, and shells. These undifferentiated surficial deposits are 1 to 35 feet thick with an average depth to groundwater of 4 to 10 feet below land surface. The Miocene Hawthorn Group underlies the surficial aquifer system and ranges from 1 to 35 feet to a total of 356 to 400 feet thick. This formation acts as an upper confining unit for the underlying Floridan Aquifer System, which is a continuous sequence of carbonate rocks of generally high permeability.

Within the 4-mile radius of the facility, a portion of the population obtains potable water from shallow private or community wells completed in the surficial aquifer. Groundwater is also used for irrigation of farms and groves.

Surface water run-off from the facility is directed to a ditch system surrounding the waste source areas. These ditches can empty into one of two canals on either the northern or southern portion of the property. Currently, only the northern one is used for discharge by the plant. These canals empty into creeks, and both eventually flow into Tampa Bay to complete surface water migration pathway. Additionally, the surrounding area is composed of a large number of wetlands which also accept drainage from the site. Drainage from the wetlands flows into the Little Manatee River on the north and Tampa Bay on the west. The Manatee River also eventually empties into Tampa Bay. Fishing, boating, and bathing occur in these waters. Also, several state- or federally designated protected or endangered species have ranges in the area. In fact, there is a critical habitat for the endangered Florida manatee (Trichechus manatus) located 6.5 miles from AMAX. Since the plant is in a flood plain, there is also a potential threat from flooding during wet weather.

During this sampling investigation, 44 environmental samples were collected. These include soil, groundwater, sediment, and surface water samples. The only organic pollutants of concern detected in elevated quantities in soil were toluene and carbon disulfide. Carbon disulfide, a by-product in the sulfuric acid manufacturing process, was also found in one groundwater sample collected from an onsite monitoring well. No organic compounds of concern, which are associated with the processes at the plant, were found in either sediment or surface water samples.

A sample of newly deposited gypsum was analyzed. It contained the following metals: aluminum, barium, calcium, chromium, iron, lead, magnesium, manganese, nickel, selenium, and vanadium. Those inorganics of concern detected in elevated quantities in soil samples, and also found in the gypsum, were barium, cadmium, chromium, manganese, nickel, selenium, and vanadium. Only cadmium and manganese were detected in elevated quantities in one onsite groundwater sample. The primary EPA maximum contaminant level (MCL) for drinking water standards was exceeded for manganese in this sample. Although the quantity of arsenic was not elevated, the MCL was exceeded for it in one groundwater sample collected on site. Additionally, the secondary MCL for drinking water standards for iron (300ug/l) was exceeded in seven of the onsite groundwater samples.

Chromium, lead, and vanadium were detected in elevated quantities in a sediment sample collected from the drainage ditch, while the only surface water sample containing elevated amounts of inorganics, including cadmium, chromium, lead, manganese, nickel, and vanadium, was taken from the cooling pond. There was no evidence of migration of these contaminants along the surface water pathway.

Analysis for radioactive nuclides in soil samples revealed that the onsite soil sample contained an elevated amount of radium-226 but not radium-228. Also, the amount of this nuclide in the southern drainage pathway was more elevated than in the northern drainage pathway. Values of radium-226 and radium-228 were elevated for the gypsum sample. However, none of these values exceeded the National Council on Radiation Protection and Measurements (NCRP) maximum criteria for radium-226 deposition on agricultural land (40 pCi/g). For groundwater samples, the MCL for primary drinking water standards was exceeded for gross alpha particle activity (15 pCi/l) for the background and one onsite surficial aquifer monitoring well sample. Additionally, the combined radium-226, radium-228 MCL (5 pCi/l) was also exceeded for these two samples. This value for radium-226 was exceeded for the surface water sample collected in the southern drainage pathway too. Unlike the organic and inorganic results, the elevated radium-226 values for the surface water and sediment samples collected in the southern drainage pathway indicate migration of this nuclide from AMAX along the surface water pathway.

Because of the targets associated with the four contaminant pathways and the elevated quantities of contaminants found at AMAX Phosphate, FIT 4 recommends that this site be evaluated using the HRS (effective March 14, 1991).

1.0 INTRODUCTION

The HALLIBURTON NUS Environmental Corporation Region 4 Field Investigation Team (FIT) was tasked by the U.S. Environmental Protection Agency (EPA), Waste Management Division to conduct a Site Inspection (SI) at the AMAX Phosphate Facility in Palmetto, Manatee County, Florida. The investigation was performed under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). The task was performed to satisfy the requirements stated in Technical Directive Document (TDD) number F4-9009-01. The field investigation was conducted the week of October 16, 1990.

1.1 OBJECTIVES

The objectives of this inspection were to determine the nature of contaminants present at the site and to determine if a release of these substances has occurred or may occur. Further, this inspection sought to determine the possible pathways by which contamination could migrate from the site and the populations and environments it would potentially affect. Through these objectives, a recommendation was made regarding future activities at the site.

1.2 SCOPE OF WORK

The objectives were achieved through the completion of a number of specific tasks. These activities were to:

- Obtain and review relevant background materials.
- Obtain information on local water systems.
- Determine location of and distance to nearest potable well.
- Evaluate potentially affected populations and environments associated with the groundwater, surface water, air, and soil exposure pathways.

- Develop a site sketch, to scale.

- Collect environmental samples.

2.0 SITE CHARACTERIZATION

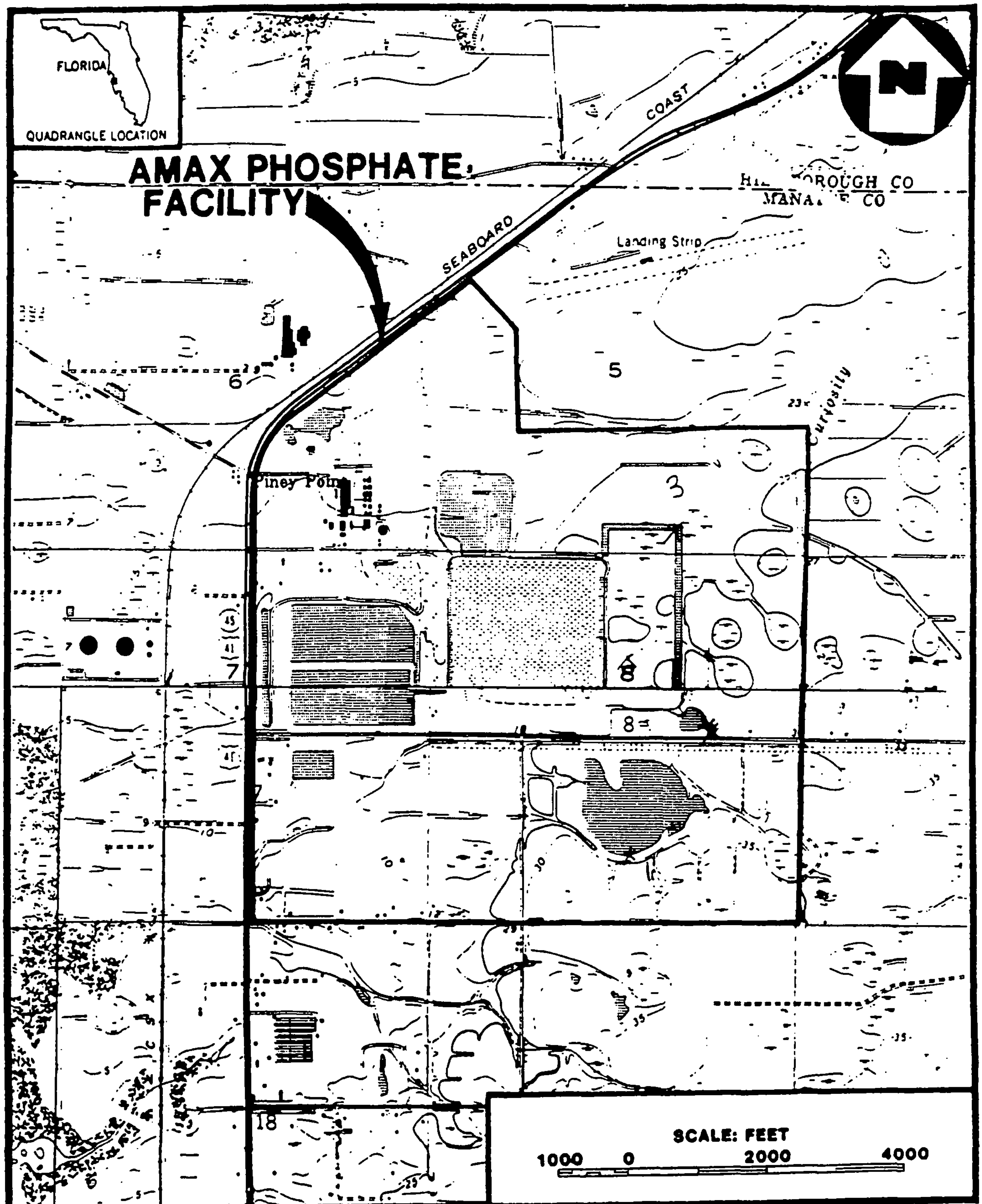
2.1 SITE HISTORY

The AMAX Phosphate Facility, Piney Point Complex site is located on approximately 670 acres, 6 miles north of Palmetto, in the northwestern corner of Manatee County, Florida (Appendix A). Phosphate ore is transported to AMAX, where it is converted to phosphoric acid and diammonium phosphate (DAP). This facility includes sulfuric acid, phosphoric acid, and ammoniated fertilizer plants along with a gypsum stack/cooling pond complex (Ref. 1). A site location map appears in Figure 1.

AMAX began operations at the facility in 1966 and expanded in 1978 (Ref. 1). It was then sold to Consolidated Minerals, Inc. of Plant City, Florida, at an unknown date, some time after February 1987 (Refs. 1, 2). At the end of 1988, Royster Phosphates, Inc. purchased the facility from Consolidated (Ref. 3). On November 1, 1990, Royster sold the plant to Atlantic Fertilizer Company as a joint venture with Gulf Atlantic; however, Royster is still responsible for the facility's management (Ref. 4).

The plant has been permitted by the Florida Department of Environmental Regulation (FDER) to discharge process and nonprocess wastewater into two drainage ditches. Outfalls 001 and 003, to the south of the facility, flow into a drainage ditch which empties into Bishop Harbor, an outlet to Tampa Bay, while Outfall 002, to the north, drains into a ditch which discharges into Piney Point Creek, then into Tampa Bay (Ref. 5). Outfalls 001 and 002 are for nonprocess water, while Outfall 003 is for treated process water. Outfall 001 was used for the last time in September 1989, and 003 was last used in March 1989. Presently, Outfall 002 is the only one used. All three outfalls are still permitted (Refs. 4, 6).

In 1982, a study was conducted by the U.S. Geological Survey on the effect of groundwater contamination in the area of gypsum stacks. The following contaminants were present in excess of primary drinking water standards at AMAX: silver, arsenic, chromium, cadmium, lead, fluoride, and selenium. Elevated levels of these inorganics in the groundwater extended to 50 feet beyond the stacks for silver, lead, fluoride, and selenium; to 200 feet for arsenic and cadmium; and to 300 feet for arsenic and cadmium; and to 300 feet for chromium (Ref. 1, p. 6, Tables 2, 3). Additionally, a groundwater monitoring plan was submitted to the FDER, Southwest District, in September 1983, and issued in September 1985, but was withdrawn in October 1985. After the company collected and submitted more information, the second permit was issued in March 1987. During this monitoring, groundwater quality problems, which include the following quantities exceeding primary drinking



BASE MAP IS A PORTION OF THE U.S.G.S. 7.5 MINUTE QUADRANGLE PALMETTO 1987, COCKROACH BAY 1981, FLORIDA.

SITE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 1

NUS CORPORATION

water standards, were noted in 1988: sodium (180 mg/l), sulfate (745 mg/l), total dissolved solids (TDS) (1586 mg/l), manganese (0.31 mg/l), and iron (2.9 mg/l) (Ref. 1).

2.2 SITE DESCRIPTION

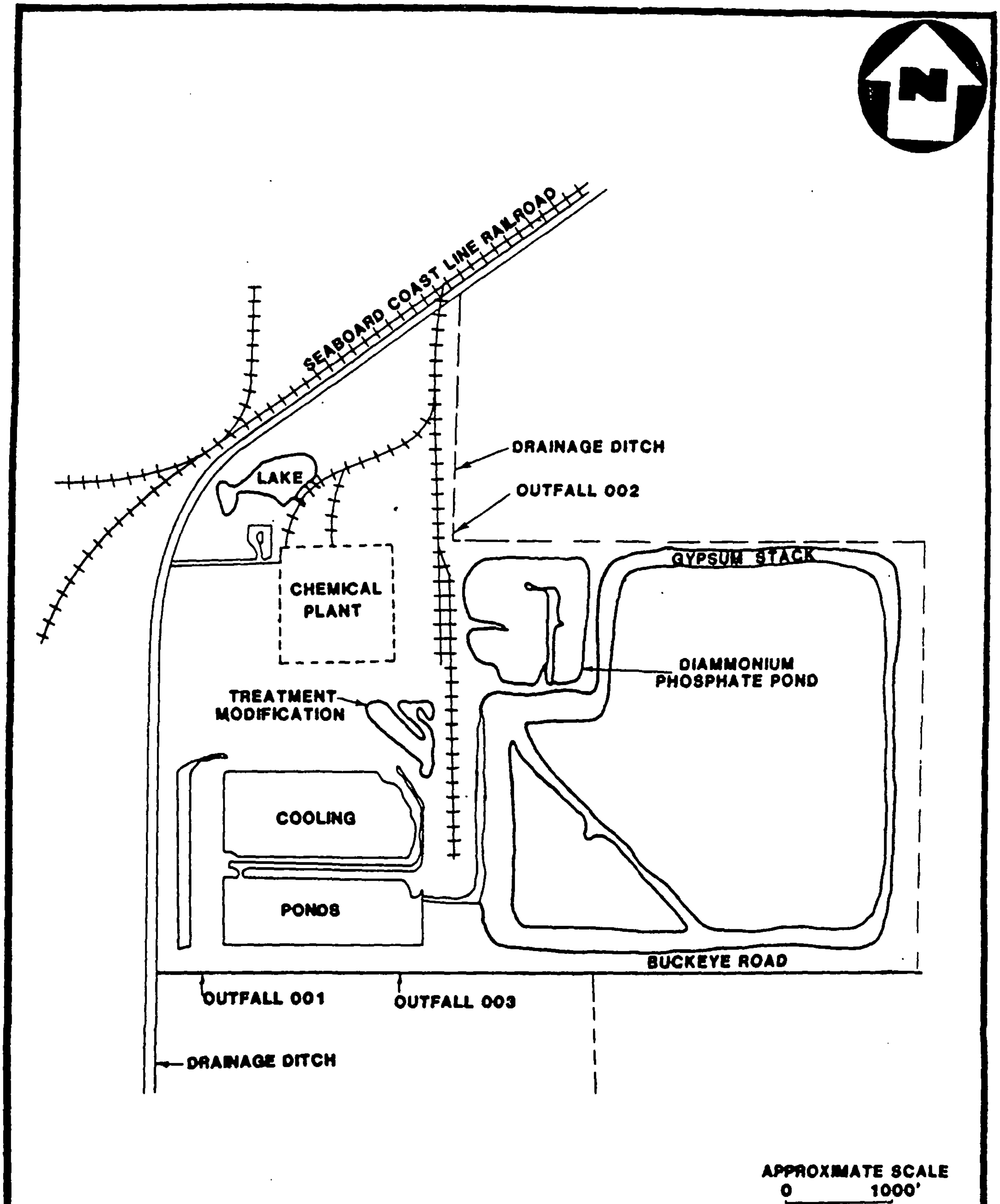
2.2.1 Site Features

AMAX Phosphate is a phosphoric acid complex situated on approximately 670 acres of flat terrain. It is bordered on the west by Highway 41, on the south by Buckeye Road and a citrus grove, on the east by farmland, and on the north by the Manatee Airport, a landing strip. A drainage ditch for nonprocess water on the northern border empties into Piney Point Creek and then into Tampa Bay approximately 2 miles west of the facility, while a drainage ditch along the southern border empties into Bishop Harbor 1 mile to the west, and this also converges with the bay (Appendix A). The plant is fenced on the western, northern, and eastern borders with a guardhouse to the north. Access can be gained by foot on Buckeye Road at the southern border (Ref. 4).

As stated in the preceding section, the complex includes several parts associated with the manufacturing process. An approximately 5-acre manufacturing portion, located to the northwest, consists of sulfuric acid, phosphoric acid, and DAP plants. The largest portion of the property is used for gypsum stacks, the calcium sulfate by-product from the phosphoric acid process, which occupy approximately 253 acres on the southeast. The stacks are surrounded by a drainage ditch that channels water from the stacks back to the plant and also inhibits lateral migration of leachate from the gypsum. There is also a 32-acre DAP pond in the northwest corner of the gypsum stack area, while a 77-acre cooling pond is located in the southwestern corner. Additionally, there is a 1-acre, ammonia removal pond northeast of the cooling pond. Process and nonprocess water, along with gypsum, are pumped to waste disposal areas on the facility, and a network of drainage ditches ultimately leads to the two ditches mentioned above. Railroad tracks, with a spur going into the plant on the northern border of the property, are located along the western border (Ref. 4). A site layout map appears in Figure 2.

2.2.2 Waste Characteristics

The main products which AMAX produces and sells are phosphoric acid and the fertilizer, DAP. In order to make these products, the plant first manufactures sulfuric acid which is used to digest the phosphate ore. The phosphoric acid, produced in this process, is then reacted with ammonia to yield the final product, DAP. AMAX manufactures 2,000 tons of sulfuric acid per day by burning sulfur in air in the presence of a catalyst. Then, the sulfur oxide formed is absorbed in water to produce the



SITE LAYOUT MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 2

NUS CORPORATION

acid. Brink mist eliminators in towers remove escaping acid mist and sulfur oxide before they are released into the environment. This facility's sulfuric acid plant is the largest single-unit plant in the world. Besides using all of the acid it produces, AMAX purchases an additional 300 tons per day.

Phosphate rock is purchased from a mine in Hillsborough County, Florida. It is crushed and slurried with sulfuric acid. The resulting slurry is filtered to remove the phosphoric acid, formed in the process, from the calcium sulfate or gypsum. The latter is pumped to a gypsum stack/cooling pond complex. The acid formed during this process is concentrated to 54 percent. Impurities in the acid are removed and shipped out of the plant in tanks. The process water from this production has an acidic pH between 1.8 and 2.0. It is used to transport the gypsum to the top of the stack and is recirculated to the plant (Refs. 4, 7). Exhaust from the production is washed with recycled water to remove harmful gases before it is discharge from the stack (Refs. 4, 7).

In order to produce DAP 18-46-0, anhydrous ammonia, phosphoric acid, and 75 percent phosphate rock are mixed together. The resulting slurry is pumped to a solid-materials handling system where the aqueous portion is removed, and the DAP is dried. This plant is one of the largest of its kind in the world. Scrubbers inhibit dust and fumes from being released into the atmosphere. The final product is either used directly as fertilizer or is processed further by other fertilizer plants (Refs. 4, 7).

In the production of DAP and phosphoric acid, gases and particulates are captured by water stream scrubbers. This water is recirculated and reused in production processes. Water is used to slurry the gypsum, and after depositing the gypsum, this water is also recirculated. Once water has come in contact with either the gaseous emissions, dust, or gypsum, it is contaminated and cannot be released by the plant; therefore, excess water is kept in holding ponds. In order to minimize the volume of water, there is an evaporation system consisting of sprayers in the holding areas. During the rainy season when accumulation is increased, water is treated before it is released from the site. Before releasing the water, fluorides and phosphorous products are removed as solids and deposited on the gypsum stacks, and the acidic pH is neutralized with lime (Refs. 4, 7).

The potential for pollution of air and water is inherent in the production and use of fertilizers. The impurities resulting from these manufacturing processes can be inadvertently released into the environment through several pathways and consist of a variety of substances. The plant process water characteristically has a low pH and contains a high concentration of inorganic by-products from the phosphate rock. In addition to high levels of radioactive particle emissions (including mostly uranium-238, radium-226), there are also elevated concentrations of arsenic, cadmium, chromium, lead, sodium, fluoride, manganese, iron, sulfate, and TDS. A study conducted by the Environmental Protection Agency (EPA) indicated that only radium-226, uranium-238, chromium, and arsenic were present in large enough quantities in phosphogypsum to exceed health-based screening limits (Ref. 8, pp. 12-6, 12-7). Leachate, however, has a higher concentration of contaminants of concern. It was found that the following concentrations of metals in leachate provided a potential health or environmental risk if released into either groundwater or surface water: arsenic, lead, cadmium, chromium, fluoride, zinc, antimony, copper, thallium, nickel, iron, silver, and mercury (Ref. 8, pp. 12-8, 12-9).

Unless the gypsum stacks and cooling ponds are underlain with an impervious liner, contaminants can be discharged to groundwater; however, the soils under the stacks can neutralize or buffer the pH causing some contaminants to precipitate from solution and thus attenuate their migration (Refs. 1; 8; 9, pp. 7, 10; 10, pp. 105-108, 114-119). Also, phosphates, when released into the environment, increase algal growth in surface water which upsets the natural biological balance (Ref. 11, p. 471). Because of the low pH of the process water, some of the fluorides are converted to gaseous hydrogen fluoride and transmitted into the environment during the sprinkling involved with the evaporation process on the gypsum stacks. Fluorides have been periodically found in citrus tree foliage and grass used for cattle grazing in the area (Ref. 4). Additionally, escaping dust and fumes from the plant's stacks can transmit airborne particulate pollutants and by-products.

3.0 REGIONAL POPULATIONS AND ENVIRONMENTS

3.1 POPULATION AND LAND USE

3.1.1 Demography

AMAX Phosphate Facility is located in a sparsely populated area that is mainly used for agriculture and heavy industry (Ref. 4, Appendix A). The total population within a 4-mile radius is 3,817 with the following distribution: 251 between 0 and 1 mile (3.8 residents/residence x number of residences), 679 between 1 and 2 miles, 221 between 2 and 3 miles, and 2,666 between 3 and 4 miles (Ref. 12, Appendix A). There are no schools within 4 miles of the facility (Appendix A).

3.1.2 Land Use

The area to the west of AMAX is predominantly industrial with Port Manatee 1.5 miles to the west. There is a landing strip, Manatee Airport, directly to the north. The immediate area to the south consists of a citrus grove, while there is a cattle ranch and turf farm to the west. The closest neighbors are located in four trailers 50 feet east of the gypsum stacks. The area surrounding the facility is also composed of a large concentration of wetlands (Refs. 4, 13, Appendix A). During the investigation, stressed vegetation was noted along the plant's borders. Also, at times large volumes of smoke were seen emitting from the facility's stacks (Refs. 4, 13). A number of species, having either state or federal protection status, inhabit the area (Ref. 14).

3.2 SURFACE WATER

3.2.1 Climatology

The climate in Manatee County is characterized by long, warm, humid summers and short, mild winters. Average monthly temperatures range from 61°F in January to 82°F in July and August with an average annual temperature of 73°F. Although some rainfall occurs during every month, the season with the highest rainfall extends from June through September (Ref. 15, p. 11). The net annual rainfall is 4 inches (Ref. 16, pp. 43, 63), while the 1-year, 24-hour rainfall is also 4 inches (Ref. 17, p. 93).

3.2.2 Overland Drainage

Surface water run-off from the facility is directed to a ditch system surrounding the waste source areas. These ditches, which accept process and nonprocess water, eventually drain into two canals, one to the north and one running parallel to Buckeye Road on the south. Formerly, two outfalls, 001 and 003 for nonprocess and process water respectively, emptied into the latter canal. This canal also receives drainage from the agricultural land on the west. It flows under Highway 41 and converges with a railroad canal. This canal enters a creek leading to Bishop Harbor 1 mile west of the site, and Bishop Harbor flows into Tampa Bay 1 mile downgradient from this point. Outfall 002, for nonprocess water, is currently in use. It enters a canal on the northern part of the site and flows west under Highway 41 into Piney Point Creek 2,500 feet from AMAX. This creek converges with Tampa Bay 2 miles northwest of the plant (Refs. 4, 13, Appendix A). Additionally, the surrounding area is composed of a large number of wetlands which may accept drainage from the site. Eventually, these wetlands drain into small creeks that also flow toward Tampa Bay to the west and the Little Manatee River 5 miles to the north. This river also empties into Tampa Bay (Appendix A).

3.2.3 Potentially Affected Water Bodies

During the site investigation, people were seen fishing in Bishop's Creek which accepts run-off from the canal south of the plant (Ref. 4, p. 23). Also, Bishop's Harbor is often used for recreational fishing (Ref. 6). The Tampa Bay area supports additional recreational activities such as boating and swimming (Ref. 4, Appendix A). The Manatee County Water Department obtains water from Lake Manatee, which is not on the surface water migration pathway. The remainder of the people obtain potable water from private or community wells; therefore, there are no intakes along the surface water migration pathway (Ref. 4). Part of the plant, along with the area to the west toward Tampa Bay, is on a flood plain. During flooding, the migration of contaminants from the site to the surface water system would be enhanced (Ref. 18). Several state- and federally protected or endangered species inhabit the area (Refs. 8, pp. 12-17, 12-18; 14). In fact, the endangered Florida manatee (Trichechus manatus) is often sighted in the Little Manatee River (Ref. 4). A critical habitat for this species is located 6.5 miles from the plant (Ref. 8, pp. 12-17, 12-18).

3.3 GROUNDWATER

3.3.1 Hydrogeology

The AMAX Phosphate Facility is located in the Gulf Central Lowlands subdivision of the Atlantic (Gulf) Coastal Plain physiographic province and the southeast coastal plain hydrogeologic setting in northwest Manatee County, Florida (Refs. 15, p. 105; 19, plate 28; 20, pp. 277-278). Elevations at the facility range between 8 and 35 feet above mean sea level (amsl) (Appendix A). The major soil types in the area of the facility include the Palmetto, Wabasso, Eau Gallie, and Bradenton fine sands and the Chobee loamy fine sand (Ref. 21, plates 1, 5).

The facility is underlain by Miocene to Recent undifferentiated surficial sands, sandy limestone, and shells whose composition may vary laterally and vertically. These undifferentiated surficial deposits range between approximately 1 to 35 feet thick, and comprise the unconfined surficial aquifer system (Refs. 15, p. 129; 22, p. 62). The average depth to the water table in the area of the facility ranges between 4 and 10 feet below land surface (bls) (Ref. 4). The water table forms a subdued replica of the topographic surface in the area. Seasonal fluctuations of water levels in the surficial aquifer are generally less than 5 feet and are very dependent upon the availability of water (Ref. 15, p. 129). Transmissivity values of the surficial aquifer in Manatee County range from less than 267 to approximately 5,304 ft^2/day (Ref. 15, Table 3, p. 35, p. 129). Estimates of storage coefficients of the surficial aquifer range between 0.05 and 0.12, based on laboratory specific-yield tests of sands, sandy limestone, and shells of similar composition to those in the surficial aquifer in Manatee County (Ref. 15, p. 131).

The Miocene Hawthorn Group underlies the surficial aquifer system. The Hawthorn Group ranges between 1 to 35 feet bls and ranges between 356 and 400 feet thick in the facility area (Refs. 15, p. 129; 22, Figure 38, p. 62). The Arcadia Formation and the Tampa Member of the Arcadia Formation comprise the Hawthorn Group in the area of the facility (Ref. 22, Figure 38, p. 62). The Arcadia Formation consists of limestone and dolostone containing varying amounts of quartz sand, clay, and phosphate grains. Sand lenses composed of very fine- to medium-grained quartz sand occur irregularly throughout the formation and are usually less than 5 feet thick. Discontinuous clay lenses also occur sporadically throughout the Arcadia Formation. The clay lenses are generally less than 5 feet thick and are composed of quartz sandy, silty, phosphatic, and dolomitic clays (Ref. 22, p. 58). The Arcadia Formation is approximately 221 feet thick in the area of the facility (Ref. 22, Figure 38, p. 62).

The Tampa Member of the Arcadia Formation is composed primarily of limestone with minor dolomite, sands, and clays. The Tampa Member is approximately 135 feet thick in the area of the facility. The texture and composition of the limestones range from mudstones to packstones. The dolostones range from microcrystalline to very fine-grained in texture and are quartz sandy and clayey in composition with minor to no phosphate. Sand and clay beds occur occasionally within the Tampa Member and are similar in composition and thickness as those found in the overlying Arcadia Formation, except for a significantly lower phosphate content (Ref. 22, p. 70).

The Hawthorn Group acts as an upper confining unit for the underlying Floridan Aquifer System. The rocks that comprise the upper confining unit vary greatly in lithology and are complexly interbedded. Clay beds found in the Hawthorn Group act as very effective confining beds. Vertical hydraulic conductivity values for Hawthorn Group clays, as established from aquifer tests and core samples, range between 5.29×10^{-6} and 2.75×10^{-10} cm/sec (1.5×10^{-2} and 7.8×10^{-7} ft/day) (Ref. 23, p. B-43).

The Oligocene Suwannee Limestone underlies the Hawthorn Group. The Suwannee Limestone is composed of hard, yellow to creamy, fossiliferous limestones. The upper part of the Suwannee Limestone contains thin, discontinuous chert lenses; the basal portion is interbedded with quartz sand and dolomite. The Suwannee Limestone ranges up to approximately 300 feet thick (Refs. 15, p. 28; 23, pp. B-32, B-33).

The Eocene Ocala Limestone underlies the Suwanee Limestone. The Ocala Limestone consists of three units: the Crystal River Member, the Williston Member, and the Inglis Member. All three members are composed of cream to white fossiliferous limestone interbededded with chert beds. The Inglis Member of the Ocala Limestone often contains gray to brown dolomite. The Ocala Limestone ranges between 300 and 600 feet thick (Refs. 15, p. 28; 23, p. B-30).

The Eocene Avon Park Formation underlies the Ocala Limestone. The Avon Park Formation consists of brown fossiliferous limestone. The upper portion of the Avon Park Formation occasionally contains layers of carbonaceous material or peat, and the basal portion may contain small evaporite lenses. The Avon Park Formation may be greater than 1,000 feet thick (Refs. 15, p. 28; 23, pp. B-25, B-27).

The Lower Eocene Oldsmar Formation underlies the Avon Park Formation. The Oldsmar Formation consists of micritic to finely pellital limestone thinly interbedded with fine- to medium-crystalline, vuggy dolomite. The basal portion of the formation is usually more extensively dolomitized than the upper portion and contains pore-filling gypsum deposits and thin beds of anhydrite. The Oldsmar Formation and other lower Eocene carbonate rocks are approximately 1,500 feet thick (Ref. 23, pp. B-22-B-23, plates 3, 33).

The Floridan Aquifer System is a vertically continuous sequence of carbonate rocks of generally high permeability that ranges from late Paleocene to early Miocene age. Less permeable carbonate rocks separate the aquifer system into two aquifers: the Upper and Lower Floridan aquifers (Ref. 23, p. B-45). The Upper Floridan aquifer is composed of the lower portion of the Tampa Member of the Arcadia Formation (Hawthorn Group), the Suwannee Limestone, the Ocala Limestone, and the Avon Park Formation (Ref. 23, pp. B-44, B-47). The top of the Upper Floridan aquifer ranges from 357 to 400 feet bls in the area of the facility (Refs. 22, p. 62; 23, plate 26). The Upper Floridan aquifer is approximately 1,250 feet thick (Ref. 23, plate 28). Transmissivity values range from approximately 4,900 to 160,000 ft^2/day (Ref. 15, p. 137). The storage coefficients of the Upper Floridan aquifer in Manatee County range from 2.0×10^{-4} to 2.0×10^{-3}. Leakage to the Upper Floridan aquifer is estimated to range from 4.0×10^{-5} to 2.7×10^{-3} ft/day) (Ref. 15, p. 137). The base of the Upper Floridan aquifer is located at approximately -1,650 amsl (Ref. 23, plate 29). The Avon Park Formation is the deepest potable, water-bearing formation in the Upper Floridan aquifer (Ref. 15, p. 28).

3.3.2 Aquifer Use

Within a 4-mile radius of AMAX, the majority of people to the southwest, obtain potable water from the Manatee County Water Department. The remaining people receive water from either private or community wells (Refs. 4, 24, 25). A house count using topographic maps indicates that there are 251 residences using wells within 3 miles of the facility with an additional 260 within 3 to 4 miles (Appendix A). The majority of these wells are completed in the surficial aquifer. Groundwater is also used for irrigation of the farms and groves (Ref. 25).

4.0 FIELD INVESTIGATION

4.1 SAMPLE COLLECTION

During the field investigation, conducted the week of October 15, 1990, FIT 4 attempted to identify and characterize contaminants which may be present in the environment as a result of activities that were conducted at AMAX Phosphate Facility. To accomplish this, FIT 4 collected environmental surface soil, subsurface soil, sediment, surface water, and groundwater samples from a number of strategic locations. These locations were selected based on historical information, hydrogeological data for the region and site area, and direct observation at the site.

4.1.1 Sample Collection Methodology

All sample collection, sample preservation, and chain-of-custody procedures used during this investigation were in accordance with the standard operating procedures as specified in Sections 3 and 4 of the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division, April 1, 1986.

4.1.2 Duplicate Samples

Duplicate samples were offered to and declined by Ivan Nance, a designated representative of Royster Phosphates, Inc. Receipt for sample forms are on file at FIT 4.

4.1.3 Description of Samples and Sample Locations

During the sampling investigation, a total of 44 environmental samples were collected. The samples collected in each media include the following: six surface soil and one gypsum, six subsurface soil, nine surface water, 11 sediment, five groundwater from temporary wells, five groundwater from existing monitoring wells, and one groundwater from a private well. Subsurface soil samples were collected 4 to 10 feet below land surface (bls) at the zone of saturation. Groundwater samples were taken from the same depths.

Four sets of surface soil, subsurface soil, and groundwater samples were taken in conjunction with each other. Two of these sets, one collected to the north of AMAX (AP-SS-01, AP-SB-01, AP-TW-01) and one to the east (AP-SS-02, AP-SB-02, AP-TW-02) served to establish background conditions. The remaining two sets were collected near waste source areas to determine migration of contaminants. One was taken southwest of the chemical plant (AP-SS-04, AP-SB-04, AP-TW-04) and the other west of the cooling pond (AP-SS-05, AP-SB-05, AP-TW-05). Another surface soil sample was taken near the diammonium phosphate (DAP) pond (AP-SS-03) with the subsurface and groundwater samples (AP-SB-03, AP-TW-03) collected a few feet to the west of the corresponding surface soil sample. A final set of soil samples (AP-SS-06, AP-SB-06) was collected between the cooling pond and drainage ditch. In order to characterize the contaminants in gypsum, a freshly deposited sample (AP-SS-07) was removed from the gypsum stacks.

Nine sets of surface water and sediment samples were collected in conjunction with each other. Two sets, one collected north of the site in the Little Manatee River (AP-SW-01, AP-SD-01) and the other southeast of the facility in Cabbage Slough Creek (AP-SW-02, AP-SD-02) served to establish background conditions. In order to characterize contaminants, two sets were taken from source areas, the cooling (AP-SW-09, AP-SD-09) and ammonia removal (AP-SW-11, AP-SD-11) ponds. Five sets were collected from locations to determine if pollutants were migrating from the facility. Two of these were taken along the drainage pathway of outfalls 001 and 003, which are no longer in use. One set (AP-SW-04, AP-SD-04) was collected downgradient from the outfalls in the drainage ditch and the other (AP-SW-05, AP-SD-05) at the confluence of the ditch and Bishop Creek. The remaining three sets were collected in the drainage pathway of Outfall 002. One of these (AP-SW-06, AP-SD-06) was taken in the drainage ditch downgradient from the outfall, another (AP-SW-07, AP-SD-07) a few feet west, and the third (AP-SW-08, AP-SD-08) in Piney Point Creek. A tenth sediment sample (AP-SD-10) was also collected from the DAP pond to characterize contaminants, and another (AP-SD-12) was taken from the drainage ditch by the gypsum stacks to determine migration of contaminants from the stacks.

Five groundwater samples were collected from existing monitoring wells to determine if contaminants had migrated into the groundwater. Four of these samples (AP-MW-01, AP-MW-03, AP-MW-04, AP-MW-05; 12.5 - 20.15 feet bls) were from wells installed in the surficial aquifer and the fifth from a well installed in the the intermediate aquifer (AP-MW-06; 63.7 feet bls). Also, a private well (AP-PW-01) to the east of AMAX was sampled. Sample codes, descriptions, locations, and rationale are contained in Tables 1, 2, and 3. Sample locations are shown in Figures 3, 4, and 5.

TABLE 1

SAMPLE CODES, DESCRIPTIONS, LOCATIONS, AND RATIONALE
SOIL SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Description	Location	Rationale
AP-SS-01	Surface Soil	West side of Manatee Airport Road, 2,000 feet feet north of AMAX	Establish background conditions
AP-SS-02	Surface Soil	East of gypsum stacks 50 feet from AMAX	Establish background conditions
AP-SS-03	Surface Soil	West side of DAP pond, between drainage ditch and pond	Determine migration of contaminants
AP-SS-04	Surface Soil	Southwest corner of chemical plant, west of fence	Determine migration of contaminants
AP-SS-05	Surface Soil	West of cooling pond between drainage ditch and rainwater pond	Determine migration of contaminants
AP-SS-06	Surface Soil	Between drainage ditch and cooling pond	Determine migration of contaminants
AP-SS-07	Gypsum	Gypsum stacks	Characterize contaminants
AP-SB-01	Subsurface Soil	In conjunction with AP-SS-01, collected 4' bls	Establish background conditions
AP-SB-02	Subsurface Soil	In conjunction with AP-SS-02, collected 4' bls	Establish background conditions
AP-SB-03	Subsurface Soil	West of DAP pond and drainage ditch, collected 8' bls	Determine migration of contaminants
AP-SB-04	Subsurface Soil	In conjunction with AP-SS-04, collected 4' bls	Determine migration of contaminants
AP-SB-05	Subsurface Soil	In conjunction with AP-SS-05, collected 10' bls	Determine migration of contaminants
AP-SB-06	Subsurface Soil	In conjunction with AP-SS-06, collected 4' bls	Determine migration of contaminants

AP - AMAX Phosphate Facility
SS - Surface Soil
SB - Subsurface Soil

TABLE 2

SAMPLE CODES, DESCRIPTIONS, LOCATIONS, AND RATIONALE
GROUNDWATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Description	Location	Rationale
AP-TW-01	Groundwater	In conjunction with AP-SS-01, collected 7' bls	Establish background conditions
AP-TW-02	Groundwater	In conjunction with AP-SS-02, collected 4' bls	Establish background conditions
AP-TW-03	Groundwater	In conjunction with AP-SS-03, collected 10' bls	Determine migration of contaminants
AP-TW-04	Groundwater	In conjunction with AP-SS-04, collected 4' bls	Determine migration of contaminants
AP-TW-05	Groundwater	In conjunction with AP-SS-04, collected 10' bls	Determine migration of contaminants
AP-MW-01*	Groundwater	Southeast corner of plant, surficial aquifer, 15.2' bls	Determine migration of contaminants
AP-MW-03	Groundwater	East of chemical plant, surficial aquifer, 21.2' bls	Determine migration of contaminants
AP-MW-04	Groundwater	North of cooling ponds, surficial aquifer, 22.6' bls	Determine migration of contaminants
AP-MW-05	Groundwater	South of Buckeye Road, surficial aquifer, 15.2' bls	Determine migration of contaminants
AP-MW-06	Groundwater	West of gypsum stack drainage ditch, intermediate aquifer, 65.5' bls	Determine migration of contaminants
AP-PW-01	Groundwater	West of gypsum stacks, 50 feet east of AMAX	Determine migration of contaminants

AP - AMAX Phosphate Facility
TW - Groundwater, Temporary Well
MW - Groundwater, Monitoring Well
* AP-MW-02 was not collected.

TABLE 3

SAMPLE CODES, DESCRIPTIONS, LOCATIONS, AND RATIONALE
SURFACE WATER AND SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Description	Location	Rationale
AP-SW-01	Surface Water	Little Manatee River 5 miles north of AMAX	Establish background conditions
AP-SW-02*	Surface Water	Cabbage Slough Creek 1.5 miles east of AMAX	Establish background conditions
AP-SW-04	Surface Water	Southwest corner of AMAX in drainage ditch downgradient from outfalls 001 and 003	Determine migration of contaminants
AP-SW-05	Surface Water	Confluence of drainage ditch and Bishop Creek	Determine migration of contaminants
AP-SW-06	Surface Water	Drainage ditch downgradient from Outfall 002	Determine migration of contaminants
AP-SW-07	Surface Water	Drainage ditch downgradient from Outfall 002 east of Highway 41	Determine migration of contaminants
AP-SW-08	Surface Water	Piney Point Creek 20 feet north of County Line Road	Determine migration of contaminants
AP-SW-09*	Surface Water	East end of cooling pond	Characterize contaminants
AP-SW-11	Surface Water	West end of ammonia removal pond	Characterize contaminants
AP-SD-01	Sediment	In conjunction with AP-SW-01	Establish background conditions
AP-SD-02*	Sediment	In conjunction with AP-SW-02	Establish background conditions
AP-SD-04	Sediment	In conjunction with AP-SW-04	Determine migration of contaminants
AP-SD-05	Sediment	In conjunction with AP-SW-05	Determine migration of contaminants
AP-SD-06	Sediment	In conjunction with AP-SW-06	Determine migration of contaminants

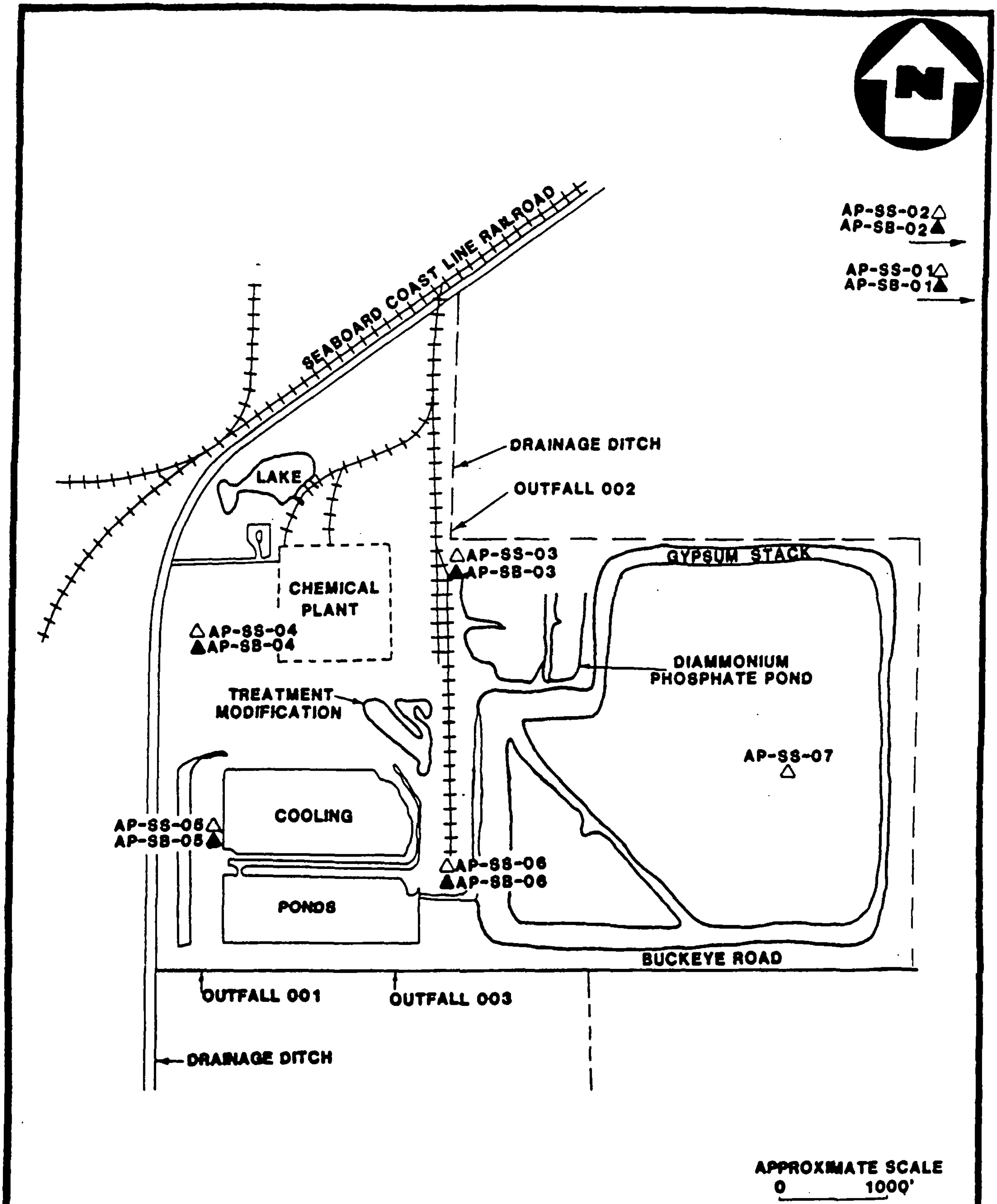
AP - AMAX Phosphate Facility
SW - Surface Water
SD - Sediment
* AP-SW-03, AP-SW-10, and AP-SD-03 were not collected.

TABLE 3

SAMPLE CODES, DESCRIPTIONS, LOCATIONS, AND RATIONALE
SURFACE WATER AND SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Description	Location	Rationale
AP-SD-07	Sediment	In conjunction with AP-SW-07	Determine migration of contaminants
AP-SD-08	Sediment	In conjunction with AP-SW-08	Determine migration of contaminants
AP-SD-09	Sediment	In conjunction with AP-SW-09	Characterize contaminants
AP-SD-10	Sediment	DAP pond by waste inlet	Characterize contaminants
AP-SD-11	Sediment	In conjunction with AP-SW-11	Characterize contaminants
AP-SD-12	Sediment	Drainage ditch west of gypsum stacks	Determine migration of contaminants

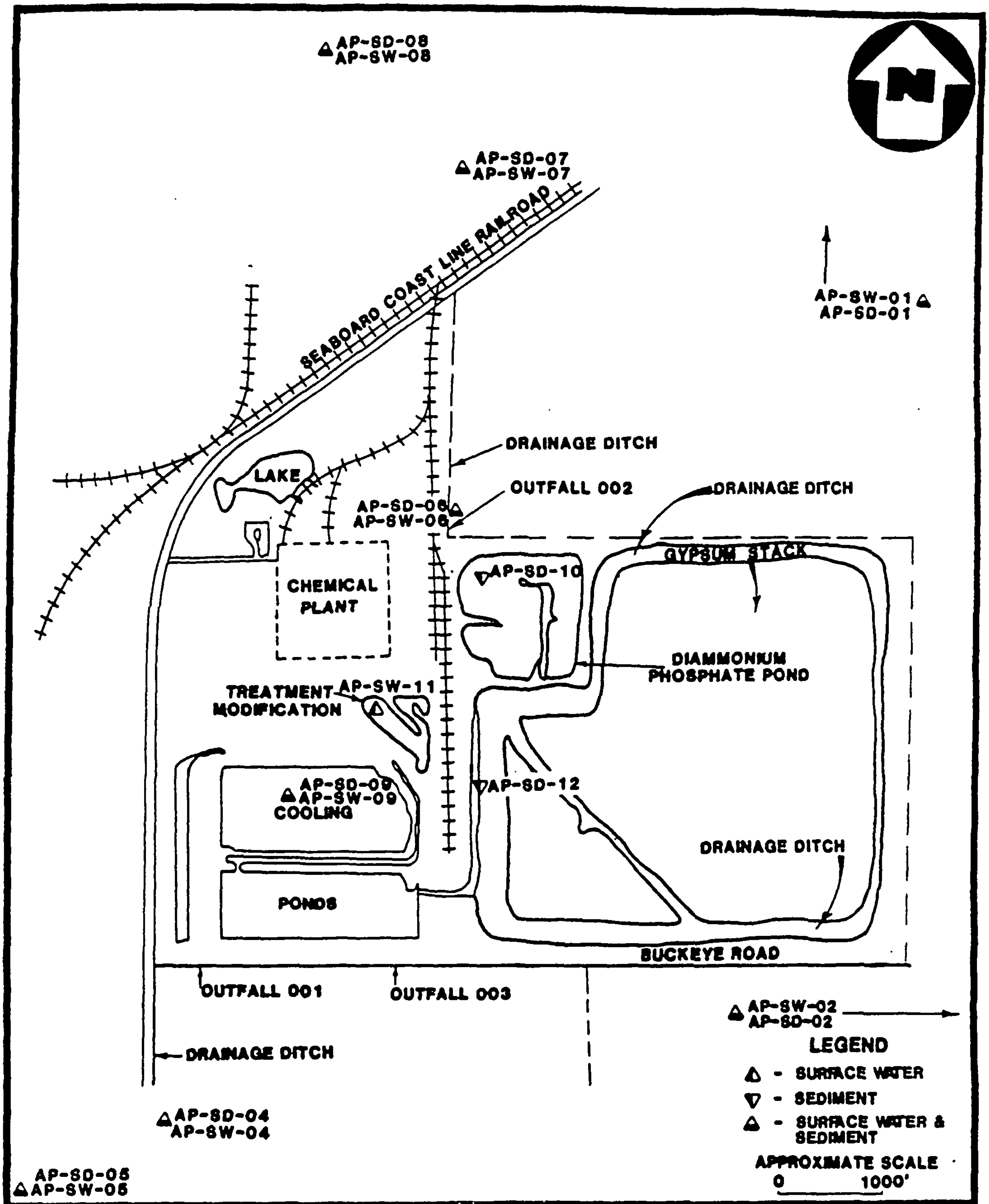
AP - AMAX Phosphate Facility
SW - Surface Water
SD - Sediment
* AP-SW-03, AP-SW-10, and AP-SD-03 were not collected.



SOIL SAMPLE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 3

NUS CORPORATION



SEDIMENT AND SURFACE WATER LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 5

NUS CORPORATION

4.1.4 Field Measurements

Field measurements were performed on all water samples (Table 4). Parameters measured included temperature, pH, and conductivity of the sample at time of collection. No field measurements were performed on the soil samples during this investigation.

4.2 SAMPLE ANALYSIS

4.2.1 Analytical Support and Methodology

All samples collected were analyzed under the Contract Laboratory Program (CLP) and analyzed for all organic parameters listed in the Target Compound List (TCL) and all inorganic parameters in the Target Analyte List (TAL). Organic analysis of soil and water samples was performed by SWOK of Broken Arrow, Oklahoma and Gulf South Environmental Laboratories of New Orleans, Louisiana. Inorganic analysis of soil and water samples was performed by Skinner and Sherman of Waltham, Massachusetts. Additionally, radioactive analysis was performed by National Air and Radiation Environmental Laboratories of Montgomery, Alabama.

All laboratory analyses and laboratory quality assurance procedures used during this investigation were in accordance with standard procedures and protocols as specified in the Laboratory Operations and Quality Control Manual, United States Environmental Protection Agency, Region IV, Environmental Services Division, issued October 24, 1990; or as specified by the existing United States Environmental Protection Agency standard procedures and protocols for the CLP Statement of Work (SOW), as applicable.

4.2.2 Analytical Data Quality and Data Qualifiers

All analytical data were subjected to a quality assurance review as described in the EPA Environmental Services Division laboratory data evaluation guidelines. In the tables, some of the concentrations of the organic and inorganic parameters have been flagged with a "J". This indicates that the qualitative analysis was acceptable, but the quantitative value has been estimated. A few other compounds are flagged with an "N", indicating that they were detected based on the presumptive evidence of their presence. This means that the compound was tentatively identified, and its detection cannot be used as positive identification of its presence. Results for some background samples are reported with a "U" flag. This flag means that the material was analyzed for but not detected. The reported number is the laboratory-derived minimum quantitation limit (MQL) for the compound or element in that sample. At times, miscellaneous organic compounds that do not

TABLE 4

FIELD MEASUREMENTS
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Date (10/90)	Time	pH	Temp. (°C)	Conductivity (umhos/cm)
AP-SW-01	16	1330	7.0	28.3	6510
AP-SW-02*	16	1415	7.2	30.0	1250
AP-SW-04	17	1620	7.0	29.0	2540
AP-SW-05	17	1645	7.1	28.0	13,200
AP-SW-06	17	1440	8.5	30.0	1930
AP-SW-07	17	1515	6.7	30.0	2390
AP-SW-08	17	1605	6.1	28.0	1920
AP-SW-09*	17	1515	2.5	30.0	17,740
AP-SW-11	17	1445	8.9	31.0	5720
AP-TW-01	16	1625	6.7	27.0	707
AP-TW-02	17	1040	6.5	28.0	180
AP-TW-03	17	1145	6.7	28.0	3320
AP-TW-04	18	1040	6.7	27.0	2870
AP-TW-05	18	0930	6.4	26.0	3390
AP-PW-01	17	0935	7.3	24.0	1070
AP-MW-01*	16	1130	6.7	27.0	980
AP-MW-03	16	0900	6.8	26.0	4050
AP-MW-04	16	1520	7.1	27.0	932
AP-MW-05	16	1350	7.3	28.0	1570
AP-MW-06	16	1615	7.4	27.0	745

* AP-SW-03, AP-SW-10, and AP-MW-02 were not collected.

TABLE 5

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/kg)	Background		On Site				Gypsum	Background		On Site			
	AP-SS-01	AP-SS-02	AP-SS-03	AP-SS-04	AP-SS-05	AP-SS-06	AP-SS-07	AP-SB-01	AP-SB-02	AP-SB-03	AP-SB-04	AP-SB-05	AP-SB-06
PURGEABLE COMPOUNDS													
TOLUENE	2J	2J	-	6J	1J	1J	-	6U	6U	-	-	-	3J
EXTRACTABLE COMPOUNDS													
PHENOL	890U	720U	-	-	-	-	480J	-	-	-	-	-	-
DI-N-BUTYLPHTHALATE	890U	720U	-	-	120J	-	-	-	-	-	-	-	-
UNIDENTIFIED COMPOUNDS/NO.(1)	8000J/5	3000J/2	8000J/6	3000J/2	5000J/4	2000J/2	1000J/1		800J/1	2000J/2			1000J/1
PETROLEUM PRODUCT(1)		N			N								
DODECANOIC ACID(1)							2000JN						
HEXADECANOIC ACID(1)							4000JN						
PESTICIDE/PCB COMPOUNDS													
4,4'-DDE (P,P'-DDE)	43U	39	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT (P,P'-DDT)	43U	39	-	-	-	-	-	-	-	-	-	-	-
GAMMA-CHLORDANE	220U	45J	-	-	-	-	-	-	-	-	-	-	-
ALPHA-CHLORDANE	220U	52J	-	-	-	-	-	-	-	-	-	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).

J Estimated value.

N Presumptive evidence of presence of material.

U Material was analyzed for but not detected. The number given is the MQL.

(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.

TABLE 6

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

	Background		On Site				Gypsum	Background		On Site			
PARAMETERS (mg/kg)	AP-SS-01	AP-SS-02	AP-SS-03	AP-SS-04	AP-SS-05	AP-SS-06	AP-SS-07	AP-SB-01	AP-SB-02	AP-SB-03	AP-SB-04	AP-SB-05	AP-SB-06
ALUMINUM	1600	200	4600	1300	6000	8300	1100	4500	1100	2900	1100	1700	3100
BARIUM	11	3U	30	13	55	33	30	20	3U	11	5.3	5.6	18
CADMIUM	0.83U	0.63U	2.6	-	4.4	3	-	0 73U	0.69U	-	-	-	-
CALCIUM	45,000	2100	96,000	9200	190,000	88,000	150,000	1900	130U	42,000	600	6700	63,000
CHROMIUM	4.9	6.8	18	-	29	42	11	7.9	1.4U	6 6	-	4.1	5.2
COBALT	1.1U	0.84U	-	-	2.4	1.5	-	-	-	-	-	-	-
IRON	1500J	300J	5200J	2600J	4300J	7000J	1800J	4300J	800J	2700J	460	700J	2500J
LEAD	7.1J	50J	9.5J	-	19J	25J	8 9J	4.3J	1J	1 8J	1.4J	1.3J	3.3J
MAGNESIUM	4500	180	220	260	1100	2700	190	240	30U	280	-	-	390
MANGANESE	24	19	10	-	95	14	25	-	-	-	-	-	-
NICKEL	1.7U	1.3U	5.6	-	9	3.5	3.9	-	-	-	-	-	-
POTASSIUM	160U	30U	420	-	860	820	-	-	-	-	-	-	-
SELENIUM	0.55UR	0.42UR	-	4.9J	-	-	-	-	-	-	-	-	-
SODIUM	280U	30U	1800	-	2600	2900	960	60U	30U	390	-	-	540
VANADIUM	5U	1U	36	-	56	42	13	6U	1U	13	-	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).

J Estimated value.

U Material was analyzed for but not detected. The number given is the MQL.

R Quality Control indicates that data is unusable. Compound may or may not be present.

TABLE 7

SUMMARY OF ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		On Site			Onsite Monitoring Wells					Private Well	Trip Blank
	AP-TW-01	AP-TW-02	AP-TW-03	AP-TW-04	AP-TW-05	AP-MW-01*	AP-MW-03	AP-MW-04	AP-MW-05	AP-MW-06	AP-PW-01	AP-PB-01
PURGEABLE COMPOUNDS												
CARBON DISULFIDE	5U	5U	-	-	-	-	-	14	-	130	-	-
ACETALDEHYDE[1]												6JN
EXTRACTABLE COMPOUNDS												
BENZOIC ACID	50U	42J	-	-	-	-	-	-	-	-	-	-
BIS(2-ETHYLHEXYL) PHTHALATE	10U	10U	-	-	-	-	-	76	-	-	-	-
DIETHYLMETHYLBENZAMIDE[1]						10JN						
BUTYLIDENEBISMETHYLETHYLMETHYLPHENOL[1]							20JN	20JN	10JN			
OCTANOIC ACID[1]							5JN		6JN			
CAPROLACTAM[1]								100JN		70JN		
UNIDENTIFIED COMPOUNDS/NO [1]								20J/1	100J/3			
DECANOIC ACID[1]									5JN			
BIS(HYDROXYLETHYL)DODECANAMIDE[1]									30JN			
TETRAMETHYLBUTANE[1]					7JN							

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-MW-02 was not collected.

TABLE 8

SUMMARY OF INORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

	Background		On Site			Onsite Monitoring Wells					Private Well	Trip Blank
PARAMETERS (ug/l)	AP-TW-01	AP-TW-02	AP-TW-03	AP-TW-04	AP-TW-05	AP-MW-01*	AP-MW-03	AP-MW-04	AP-MW-05	AP-MW-06	AP-PW-01	AP-PB-01
ALUMINUM	36,000	260,000	7300	20,000	5600	3400	750	-	1610	-	-	-
ARSENIC	14	53	18	56	-	-	30J	-	-	-	-	-
BARIUM	110	460	53	210	130	-	120	-	52	-	-	-
BERYLLIUM	2U	6	-	-	-	-	-	-	-	-	-	-
CADMIUM	3U	3U	-	-	-	-	18	-	-	-	-	-
CALCIUM	91,000	21,000	600,000	320,000	470,000	81,000	380,000	140,000	270,000	75,000	83,000	-
CHROMIUM	78	190	12	38	13	-	-	-	9	-	-	-
COBALT	7	32	-	9	-	-	-	-	-	-	-	-
IRON	26,000J	170,000J	27,000J	25,000J	2300J	3300J	10,000J	1300J	3200J	-	-	-
LEAD	18	44	-	12	5	5	-	-	-	8	-	-
MAGNESIUM	20,000	9300	36,000	25,000	39,000	37,000	16,000	16,000	61,000	22,000	40,000	-
MANGANESE	70U	70	-	39	-	73	220	-	-	-	-	-
NICKEL	18	89	-	14	-	-	-	-	-	-	-	-
POTASSIUM	29,000	2900	23,000	8000	30,000	4000	9100	2600	9300	6400	3700	-
SODIUM	28,000	2200	7000	120,000	55,000	75,000	350,000	36,000	61,000	29,000	55,000	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
* AP-MW-02 was not collected.

TABLE 8

SUMMARY OF INORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		On Site			Onsite Monitoring Wells					Private Well	Trip Blank
	AP-TW-01	AP-TW-02	AP-TW-03	AP-TW-04	AP-TW-05	AP-MW-01*	AP-MW-03	AP-MW-04	AP-MW-05	AP-MW-06	AP-PW-01	AP-PB-01
VANADIUM	74	170	-	-	130	-	-	-	-	-	-	-
ZINC	60UJ	130J	-	-	-	-	-	-	-	-	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
* AP-MW-02 was not collected.

TABLE 9

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

	Background		Southern Drainage Pathway		Northern Drainage Pathway			On Site			
PARAMETERS (ug/kg)	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
PURGEABLE COMPOUNDS											
ACETONE	13U	31U	-	-	26	-	-	37	-	-	-
CARBON DISULFIDE	6U	10J	-	-	-	-	-	-	-	-	-
TRIMETHYLBICYCLOHEPTANE(1)						30JN					
METHYL(METHYLETHYL)BENZENE(1)						200JN					
UNIDENTIFIED COMPOUNDS/NO.(1)						20J/1					
EXTRACTABLE COMPOUNDS											
BENZOIC ACID	4100U	10,000U	-	-	-	-	-	-	690J	-	-
ACENAPHTHENE	840U	2100U	-	-	-	140J	-	-	-	-	-
PHENANTHRENE	580J	2100U	-	-	-	760J	-	-	-	-	-
ANTHRACENE	140J	2100U	-	750J	-	190J	-	-	-	-	-
DI-N-BUTYLPHTHALATE	840U	2100U	-	-	-	-	-	-	-	150J	-
FLUORANTHENE	1400	2100U	-	-	-	3200	-	-	-	-	-
PYRENE	750J	2100U	-	-	-	1600	-	-	-	-	-
BENZYL BUTYL PHTHALATE	840U	2100U	-	-	-	-	210J	-	-	-	-
BENZO(A)ANTHRACENE	330J	2100U	-	120J	-	490J	-	-	-	-	-
CHRYSENE	500J	2100U	-	420J	-	710J	-	-	-	-	-

-    Material analyzed for but not detected above minimum quantitation limit (MQL).

J   Estimated value.

N   Presumptive evidence of presence of material.

U   Material was analyzed for but not detected. The number given is the MQL.

(1)   Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.

*   AP-SD-03 was not collected.

TABLE 9

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/kg)	Background		Southern Drainage Pathway		Northern Drainage Pathway			On Site			
	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
BIS(2-ETHYLHEXYL) PHTHALATE	840U	2100U	-	-	-	-	-	-	-	-	-
BENZO(B AND/OR K)FLUORANTHENE	440J	2100U	-	270J	-	470J	-	-	-	-	-
BENZO(A)PYRENE	380J	2100U	-	210J	-	350J	-	-	-	-	-
INDENO (1,2,3-CD) PYRENE	220J	2100U	-	-	-	140J	-	-	-	-	-
BENZO(GHI)PERYLENE	210J	2100U	-	-	-	-	-	-	-	-	-
UNIDENTIFIED COMPOUNDS/NO	2000J/2	50,000J/15	2000J/1	3000J/3	-	20,000J/5	20,000J/7	5000J/2	30,000J/4	50,000J/17	3000J/2
PETROLEUM PRODUCT(1)		N				N				N	
DODECANOIC ACID(1)								1000JN	20,000JN		
HEXADECANOIC ACID(1)	600JN	1000JN									1000JN
ANTHRACENEDIONE(1)	300JN										
BENZOFLUORENE(1)	300JN					300JN					
BENZOFLUORANTHENE(NOT B OR K)(1)	200JN										
BENZACEPHENANTHRYLENE(1)	500JN										
TETRAHYDRODIMETHYL(METHYETHYL)NAPHTHALENE(1)						2000JN	500JN				
NAPHTHALENOL(1)						1000JN					
HEPTADECANOIC ACID(1)						500JN		400JN			
OCTADECANOIC ACID(1)								800JN	4000JN		

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-SD-03 was not collected.

TABLE 9

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/kg)	Background		Southern Drainage Pathway		Northern Drainage Pathway			On Site			
	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
PHENYLETHANONE(1)									3000JN		
TETRADECANOIC ACID(1)									700JN		
PHENYLTRICYCLONODIENOL(1)									2000JN		
DIPHENYLPROPANEDIONE(1)									6000JN		
PESTICIDE/PCB COMPOUNDS											
PCB-1248 (AROCLOR 1248)	200U	500U	-	-	-	-	350	-	-	-	-

-   Material analyzed for but not detected above minimum quantitation limit (MQL).
J   Estimated value.
N   Presumptive evidence of presence of material.
U   Material was analyzed for but not detected. The number given is the MQL.
(1)   Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
*   AP-SD-03 was not collected.

TABLE 10

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

	Background		Southern Drainage Pathway		Northern Drainage Pathway			On Site			
PARAMETERS (mg/kg)	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
ALUMINUM	380	10,000	530	1300	1100	1000	950	21,000	4400	300	12,000
BARIUM	2U	80	19	7.5	5.2	13	13	110	72	16	64
CADMIUM	0.71U	1.9U	-	-	-	-	-	2.6	-	-	8
CALCIUM	1400	38,000	2000	3100	8400	27,000	7200	200,000	210,000	220,000	110,000
CHROMIUM	1.4U	20	-	2.8	2.4	6.1	6.6	140	24	7.1	76
COBALT	0.95U	3U	-	-	-	-	-	2.7	-	3.9	3.4
COPPER	9UJ	62J	-	-	-	-	-	-	-	-	-
IRON	440J	11,000J	830J	1600J	9000J	6400J	2100J	45,000J	12,000J	390J	18,000J
LEAD	2.8J	16J	1.1J	74J	1.7J	11J	15J	85J	26J	2.1J	59J
MAGNESIUM	200	2500	82	1100	170	200	520	2000	510	4500	9900
MANGANESE	2U	63	-	-	26	22	-	26	-	44	40
NICKEL	1.4U	6.7	-	-	2.3	2.7	-	-	4.2	17	7.6
POTASSIUM	60U	270U	-	-	-	-	-	2000	550	-	1600
SODIUM	350U	290U	-	2900	-	-	-	12000	3900	2800	6700
VANADIUM	1U	20U	-	-	-	-	-	140	24	-	130

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
* AP-SD-03 was not collected.

TABLE 11

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SURFACE WATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		Northern Drainage Pathway		Southern Drainage Pathway			On Site	
	AP-SW-01	AP-SW-02*	AP-SW-04	AP-SW-05	AP-SW-06	AP-SW-07	AP-SW-08	AP-SW-09*	AP-SW-11
PURGEABLE COMPOUNDS									
CARBON DISULFIDE	5U	5U	-	-	5	-	-	-	4J
TETRAMETHYLBUTANE(1)									8JN
EXTRACTABLE COMPOUNDS									
UNIDENTIFIED COMPOUNDS/NO.(1)					100J/3			60J/4	
BROMACIL(1)			4JN				4JN		
HEXADECANOIC ACID(1)								10JN	10JN
HYDROXYMETHOXY BENZALDEHYDE(1)								5JN	
PETROLEUM PRODUCT(1)								N	
TETRADECANOIC ACID(1)									7JN

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-SW-03 and AP-SW-10 were not collected.

TABLE 12

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SURFACE WATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		Northern Drainage Pathway		Southern Drainage Pathway			On Site	
	AP-SW-01	AP-SW-02*	AP-SW-04	AP-SW-05	AP-SW-06	AP-SW-07	AP-SW-08	AP-SW-09*	AP-SW-11
ALUMINUM	340U	16,000	-	-	-	-	-	27,000	-
ARSENIC	5U	8U	-	-	-	-	-	-	49
BARIUM	20U	120	-	29	-	-	-	63	-
BERYLLIUM	1U	1U	-	-	-	-	-	23	-
CADMIUM	3U	3U	-	-	-	-	-	130	-
CALCIUM	61,000	170,000	160,000	160,000	150,000	180,000	160,000	670,000	170,000
CHROMIUM	6U	28	-	-	-	-	-	360	-
COBALT	4U	4U	-	-	-	-	-	210	-
IRON	350UJ	14,000J	-	-	-	-	-	29,000J	-
LEAD	5	14	-	-	-	-	-	35	-
MAGNESIUM	140,000	46,000	58,000	220,000	66,000	59,000	42,000	200,000	49,000
MANGANESE	20U	110	-	-	-	-	52	4100	-
NICKEL	6U	8U	-	-	-	-	-	690	-
POTASSIUM	47,000	13,000	16,000	68,000	3700	5300	6800	160,000	89,000
SODIUM	1,100,000	68,000	110,000	1,500,000	42,000	100,000	69,000	1,200,000	650,000
THALLIUM	10UR	10UR	-	-	-	-	-	13J	-
VANADIUM	4U	30U	-	-	-	-	-	820	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
R Quality Control indicates that data is unusable. Compound may or may not be present.
* AP-SW-03 and AP-SW-10 were not collected.

TABLE 12

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SURFACE WATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		Northern Drainage Pathway		Southern Drainage Pathway			On Site	
	AP-SW-01	AP-SW-02*	AP-SW-04	AP-SW-05	AP-SW-06	AP-SW-07	AP-SW-08	AP-SW-09*	AP-SW-11
ZINC	40UJ	130UJ	-	-	-	-	-	1400J	-
CYANIDE	10U	10U	-	-	-	14	100	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
R Quality Control indicates that data is unusable. Compound may or may not be present.
* AP-SW-03 and AP-SW-10 were not collected.

TABLE 13

SUMMARY OF RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Parameters (pCi/g)(1)	Background AP-SS-01	On Site AP-SS-06	Gypsum AP-SS-07	Background AP-SD-01	Northern AP-SD-06	Southern AP-SD-12
Radium-226	0.89 ± 5.00%	8.12 ± 1.00%	16.5 ± 1.0%	0.36 ± 7.00%	0.76 ± 5.00%	7.36 ± 1.00%
Radium-228	0.56 ± 153%	0.49 ± 186%	8.10 ± 17.0%	0.85 ± 115%	0.38 ± 256%	0.73 ± 128%

(1) Results are for dry soil.

TABLE 14

SUMMARY OF RADIONUCLIDE CONCENTRATIONS IN WATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Parameters (pCi/l)	Background	Monitoring Wells		Background	Southern Drainage
	AP-TW-01	AP-MW-03	AP-MW-06	AP-SW-01	AP-SD-12
Radium-226	7.32 ± 2.00%	16.4 ± 1.00%	1.13 ± 3.00%	0.54 ± 4.00%	1.85 ± 2.00%
Radium-228	2.43 ± 87.5%	1.76 ± 64.6%	0.53 ± 81.0%	0.53 ± 85.8%	0.29 ± 182%
Gross Alpha	53.8 ± 21.6%	44.6 ± 42.4%	1.75 ± 169%	5.04 ± 235%	5.30 ± 83.3%

background); cadmium (3, 5, and 3 times MQL); chromium (3, 5, and 6 times background); and vanadium (7, 10, and 8 times MQL) were detected in all three samples. Nickel (3 and 5 times MQL) was found in two soil samples (AP-SS-03 and AP-SS-05), while manganese (4 times background) was detected in one (4 times background). The only contaminant of concern present in elevated quantities in the fourth onsite sample (AP-SS-04) was selenium (10 times MQL, estimated). There were no inorganics of concern found in elevated quantities in subsurface soil samples.

The only metals of concern detected in elevated quantities in groundwater were cadmium (6 times MQL) and manganese (3 times MQL) from AP-MW-03. This monitoring well is located in the center of the facility between the chemical plant and gypsum stacks. The EPA maximum contaminant level (MCL) for primary drinking water standards for manganese (50 ug/l) was exceeded in this sample (Ref. 26). Although arsenic was detected in levels less than 3 times background, its concentration (56 ug/l) in the sample from AP-TW-04, collected east of the chemical plant, exceeded the MCL (50 ug/l). With samples ranging in concentration from 1,300 to 27,000 ug/l, the secondary MCL (300 ug/l) for iron was also exceeded in seven of the onsite groundwater samples.

The only sediment samples with large quantities of inorganics of concern were collected from the cooling pond (AP-SD-09) and drainage ditch adjacent to the gypsum stacks (AP-SD-12). Both had chromium (7 and 3 times MQL), lead (5 and 4 times background estimated), and vanadium (7 and 6 times MQL). As with the sediment samples, onsite surface water samples were the only ones with elevated quantities of contamination. The surface water sample from the cooling pond contained cadmium (6 times MQL), chromium (13 times MQL), lead (3 times background), manganese (37 times background), nickel (86 times background), and vanadium (27 times MQL). Cyanide (10 times MQL) was also found in one offsite sample collected on the northern drainage pathway, but it is not site related. Since there were no inorganics of concern detected in elevated amounts in either offsite sediment or surface water samples, it can be assumed that these contaminants are not migrating from the facility along the surface water migration pathway.

Radium-226, radium-228, and gross alpha analyses were performed on select soil, sediment, groundwater, and surface water samples. The radium-226 and radium-228 analyses for the sample (AP-SS-07) were 18.5 and 14.5 times background respectively; while the onsite soil sample was 9.1 times background for radium-226, but not elevated for radium-228. The sediment sample collected from the northern drainage ditch (AP-SD-06) was slightly elevated (2 times background) for radium-226 and beneath background values for radium-228. Radium-226 was more elevated (10 times background) in the sediment collected in the southern drainage ditch (AP-SD-12). Although there are no specific criteria for radium deposition, the National Council on Radiation Protection and Measurements (NCRP) has recommended a guide of 40 picocuries of radium-226 per gram of soil as a concentration to be evaluated for agricultural land use (Ref. 27). All of these values are beneath that quantity.

The gross alpha particle activity for two groundwater samples (AP-TW-01, AP-MW-03) was above the maximum contaminant level (MCL) for primary drinking water standards (15 pCi/l). The sample collected from a surficial aquifer monitoring well (AP-MW-03) was 44.6 pCi/l. This value was slightly lower than the background (53.8 pCi/l) which was above the MCL. The amount of radium-226 in this monitoring well sample (AP-MW-03) was also slightly elevated (2.2 times background). Both groundwater samples (AP-TW-01, AP-MW-03) exceeded the combined radium-226, radium-228 MCL (5 pCi/l) for primary drinking water standards with combined values of 9.75 and 18.2 pCi/l, respectively. Radionuclide analyses were not elevated in the third groundwater sample. The only elevated quantity in surface water was for radium-226 (3.4 times background) in the sample collected from the southern drainage pathway (AP-SW-06).

5.0 SUMMARY

All three contaminant pathways, surface water, groundwater, contact, and air, are of concern for AMAX Phosphate. Surface water run-off from the facility is channeled by way of two drainage ditches into either Bishop Harbor then Tampa Bay, or Piney Point Creek and then Tampa Bay. Fishing, boating, and bathing occur along the surface water migration pathway. Additionally, the area is surrounded by wetlands which drain toward the north into the Little Manatee River. This river is a critical habitat for the Florida manatee (Trichechus manatus), which is often sighted in the river. There are also other federally and state-protected or endangered species with ranges in the area. Furthermore, the facility is located in a flood plain, making migration of contaminants more likely during wet weather.

Since many people within the 4-mile radius obtain potable water from shallow wells, groundwater contamination may pose a serious potential threat. Water for irrigation is also obtained from wells in Manatee County. Additionally, the area is characterized by karst terrain containing sinkholes and underground cavities.

Gases from the site make airborne contamination a potential threat. Emission of phosphorous and sulfur oxides from the stacks pose a potential problem with air contamination. Because of the acidity of the process waters, the small amount of fluorides in the gypsum are converted to hydrogen fluoride. In fact, fluorides that probably originate from hydrogen fluoride are often found during the analysis of grass and foliage. Airborne contamination was evident from the stressed vegetation surrounding the plant. This could affect the residents and cattle in the area also.

Since the gypsum stacks are in the open, and process water is evident throughout the facility, contamination from contact could pose a potential threat to onsite employees. As the facility is not fenced along the southern border, access can be attained by foot.

During this sampling investigation, 44 environmental samples were collected. These include soil, groundwater, sediment, and surface water samples. The only organic pollutants of concern detected in elevated quantities in soil were toluene and carbon disulfide. Carbon disulfide, a by-product in the sulfuric acid manufacturing process, was also found in one groundwater sample collected from an onsite monitoring well. There were no organic compounds of concern that are associated with the processes at the plant found in either sediment or surface water samples.

In order to characterize the inorganic constituents in gypsum, a sample of newly deposited material was analyzed. It contained the following metals: aluminum, barium, calcium, chromium, iron, lead, magnesium, manganese, nickel, sodium, and vanadium. Those inorganics of concern detected in elevated quantities in soil samples, and also found in the gypsum, were barium, cadmium, chromium, manganese, nickel, selenium, and vanadium. Only cadmium and manganese were detected in elevated quantities in one onsite groundwater sample. The primary EPA maximum contaminant level (MCL) for drinking water standards was exceeded for manganese in this sample. Although the quantity of arsenic was not elevated, the MCL was exceeded in one groundwater sample collected on site. Additionally the secondary MCL in drinking water for iron (300 ug/l) was exceeded in seven of the onsite groundwater samples.

Chromium, lead, and vanadium were detected in elevated quantities in a sediment sample collected on site from the drainage ditch, while the only surface water sample containing elevated amounts of inorganics, including cadmium, chromium, lead, manganese, nickel, and vanadium, was taken from the cooling pond. There was no evidence of migration of these contaminants along the surface water pathway from this study.

Analysis for radioactive nuclides in soil samples revealed that the onsite soil sample contained an elevated amount of radium-226 but not radium-228. Also, the amount of this nuclide in the southern drainage pathway was more elevated than in the northern drainage pathway (10 times versus 2 times background). Values of radium-226 and radium-228 were 18.5 and 14.5 times background, respectively, for the gypsum sample. However, none of these values exceeded the National Council on Radiation Protection and Measurements maximum criteria for radium-226 deposition on agricultural land (40 pCi/g). For groundwater samples, the MCL for primary drinking water standards was exceeded for gross alpha particle activity (915 pCi/l) for the background and one onsite surficial aquifer monitoring well sample. Additionally, the combined radium-226, radium-228 MCL (5 pCi/l) was also exceeded for these two samples. This value for radium-226 was exceeded for the surface water sample collected in the southern drainage pathway too; however, this is not a potable source. Unlike the organic and inorganic results, the elevated radium-226 values for the surface water and sediment samples collected in the southern drainage pathway indicate migration of this nuclide from AMAX along the surface water pathway.

Because of the targets associated with the four contaminant pathways and the elevated quantities of contaminants found at AMAX Phosphate, FIT 4 recommends that this site be evaluated using the HRS (effective March 14, 1991).

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REFERENCE 3

GROUND-WATER RESOURCE AVAILABILITY INVENTORY:

MANATEE COUNTY, FLORIDA

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

1961

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
MARCH 1988

GROUND-WATER RESOURCE AVAILABILITY INVENTORY: MANATEE COUNTY, FLORIDA

PREPARED BY: RESOURCE MANAGEMENT AND PLANNING DEPARTMENTS OF THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

MARCH 1988

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composed of carbonate deposits (usually dolomitic) that contain varying amounts of interbedded quartz sand, clay, and phosphate. The middle section consists of interbedded sandy carbonate, clayey sand, and sandy clay. The upper Hawthorn section is predominantly composed of clastic deposits that consist of quartz, phosphate sand and pebbles, and light green to a moderately dark gray clay (Hall, 1983). The trifold subdivision of the Hawthorn Formation is most apparent in the south. Elsewhere, one or two of these units may be absent, or the upper unit may lie directly over the lowermost unit. In the north, the units become less distinctive and merge to a single unit where a sandy phosphatic clay perdominates, or the Formation is absent. The thickness of the entire Hawthorn Formation varies from thin to absent in the northern areas of the SWCFGWB to greater than 600 feet in the southern areas.

Oligocene - The only formation of this epoch is the Suwannee Limestone. It is composed of hard, yellow or creamy fossiliferous limestone, which locally has an orange tinge. Interbeds may contain quartz sand, and dolomite is common toward the unit's base from the Tampa Bay area southward. The upper part may contain thin chert lenses and be highly macrofossiliferous. The Suwannee is exposed in parts of Pasco County, and in the northeast corner of Hillsborough County, and pinches out in Polk County. The Suwannee is as much as 300 feet thick in the southern areas of the SWCFGWB.

Eocene Epoch - The Eocene formations within the SWCFGWB consist of the Ocala Limestone, Avon Park Formation, and Oldsmar Formation, in descending order. The Ocala Limestone consists of three units. In descending order these units are the Crystal River, Williston, and Inglis. All three units generally consists of a coquinic foraminiferal limestone, usually cream to white in color. The Inglis Member frequently contains gray to brown dolomite, and chert layers that can be present throughout the entire Ocala Limestone. The Ocala Limestone outcrops in northern Polk and southern Sumter Counties within the Green Swamp area (Pride and others, 1966). The Ocala ranges in thickness from less than 300 feet in the northern areas of the SWCFGWB to greater than 600 feet in thickness in the southern areas.

The Ocala is unconformably underlain; by the middle Eocene Avon Park Formation. Lithologically, the Avon Park is composed of fossililferous limestone and dolostone. The limestone is moderate brown, dark-yellow brown to rusty-yellow brown, porous and very fine to medium grained and may be crystalline or saccharoidal in texture. The top of the Avon Park may contain peat or carbonaceous layers and the bottom may contain small lenses of evaporite. The Avon Park Formation thickens to greater than 1,000 feet in the SWCFGWB. The Avon Park is the deepest potable water bearing formation in the SWCFGWB, therefore, older geologic formations will not be discussed.

KARST ACTIVITY

Florida's landscape, including the SWCFGWB, is dominated by features of karst topography. Karst topography develops where rainfall drains internally and rocks are susceptible to solution (Ritter, 1979). In these areas, the solution process can create and enlarge cavities within the rocks and allow underground circulation of water which, in turn, promotes further solution. This leads to

TABLE 3: Major springs and flow in the Southern West-Central Florida Ground-Water Basin (from Roseneau and others, 1977).

INDEX	SPRINGS	DISCHG(CFS)	INDEX	SPRINGS	DISCHG(CFS)
1	SALT	9.5	7	SIX MILE CREEK	1.5
2	CRYSTAL	60	8	BUCKHORN	15.5
3	HEALTH	6.5	9	LITHIA	51
4	SULPHUR	44	10	KISSENGEN	9.5
5	LETTUCE LAKE	9.5	11	WARM MINERAL	1
6	EUREKA	1.5	12	UNNAMED	30

GROUND WATER

Surficial Aquifer System

A distinct surficial aquifer system exists throughout nearly all of the SWCFGWB and consists of marine and non-marine quartz sand, clayey sand, shell, shelly marl, and phosphorite, with occasional stringers of marl and limestone. The surficial system extends from land surface to the top of the upper confining bed of the Caloosahatchee Marl, Bone Valley Formation, Tamiami Formation, or Hawthorn Formation, whichever is first stratigraphically encountered. Water in the surficial aquifer system is generally unconfined; however, locally within the aquifer system are weak semi-confined layers that poorly confine the ground water. Average thickness of the aquifer is about 25 feet, but ranges from a foot or less, where limestone or clay outcrop or are near land surface, to several hundred feet beneath the Highland Ridge (Figure 13). Extreme thicknesses of 300 to 600 feet or more have been reported along the eastern side of the Lake Wales Ridge in Polk County (Stewart, 1966).

Surficial Aquifer Hydraulic Properties

Hydraulic properties of the surficial aquifer system in the SWCFGWB vary widely due to variation in types of material that comprise the aquifer; its physical characteristics, such as grain size and sorting; and thickness of the saturated zone. Hydraulic properties for the surficial aquifer system are listed in Table 4. The locations of the aquifer test sites at which these values were derived are given in Figure 19.

Transmissivity of the surficial aquifer system ranges from about 20 feet squared per day (ft^2/d) where fine clayey sand predominates, to greater than 5,000 ft^2/d in some clean shell beds in the southern areas of the SWCFGWB. Transmissivities are lowest to the north and along the coast where the aquifer is composed of mostly fine grained clastics, and saturated thickness is least. Transmissivities are greatest in southern Sarasota, Charlotte, and Lee Counties.

Specific yield of the surficial aquifer ranges from 0.05 to 0.3 (Wilson and Gerhart, 1980). Determinations of vertical hydraulic conductivity have been made from lab tests on undisturbed samples, range from 0.12×10^{-5} to 13 feet per day (ft/d) (Sinclair, 1974; Hutchinson and Stewart, 1978; Healy and Hunn, 1984). Determinations of horizontal hydraulic conductivity range from 0.0028 ft/d to greater than 1,000 ft/d (Healy and Hunn, 1984).

III. MANATEE COUNTY OVERVIEW

Geographic Setting, Physiography - Topography, and Drainage

Manatee County is located on the west-central coast of Florida and fronts on Tampa Bay at its southern-most point. Manatee County is bounded by Hillsborough County on the north, Hardee and DeSoto Counties to the east, Sarasota County on the south, and the Gulf of Mexico and Tampa Bay to the west (Figure 53). Manatee County contains about 739 square miles of land area and 46 square miles of inland surface-water area. Land surface altitudes range from sea level along the coast to about 135 feet above NGVD in the northeast (Figure 54).

The physiographic provinces of Manatee County were described by White (1970). These provinces are the Gulf Coastal Lowlands, the DeSoto Plain, and the Polk Upland (Figure 6). The ancient stands of sea level above its present level during Pleistocene time shaped the topography into marine terraces across the county. The Pamlico Terrace, generally less than 20 feet above NGVD, and the Talbot Terrace, about 40 feet above NGVD, form the relatively flat, poorly drained Gulf Coastal Lowlands. The Penholoway Terrace, about 60 to 70 feet above NGVD and the Wicomaco Terrace, about 90 to 100 feet above NGVD, make up the DeSoto Plain. The highest and oldest surface is the Sunderland Terrace that formed when the sea was 170 feet above the present level. The Polk Upland physiographic unit was formed by the Sunderland Terrace. Recent stream and river erosion have modified these terraces but large areas of relatively flat land remain where the drainage is poor.

Principal surface-water drainage for the county is through the Manatee, Little Manatee, Myakka Rivers, and their tributaries. Many coastal streams drain directly into the Gulf of Mexico. The large flatland areas of the county are poorly drained and contain many small, shallow lakes and swamps. A canal network has been dug throughout the county to augment natural drainage (Brown, 1983).

Climate

The climate of Manatee County is humid and sub-tropical, characterized by high mean annual rainfall and temperature. Warm humid summers and mild winters are the result of the low latitude and the stabilizing affect of the Gulf of Mexico and the Atlantic Ocean.

Data collected by the National Weather Service indicate that the mean annual air temperature in the county is about 72°F, and mean monthly temperatures range from 60°F in winter to 80°F in summer. Summer temperatures usually peak in the low to mid-90's but are moderated by frequent afternoon convectional thundershowers. Winter temperatures vary the most during late winter when cold fronts bring arctic air from the northwest. These fronts may bring minimal temperatures below freezing but day light temperatures rarely reach freezing levels. Cold weather generally lasts only two to three days and are separated by warm days (Wolf and others, 1986). Average low temperatures are near 50°F during the coldest months (December, January, and February).

Lessor amounts of water are withdrawn from the surficial and intermediate aquifer systems and are used primarily for domestic supply, with other uses including stock watering, agricultural irrigation, and small public supplies. Most irrigation wells that penetrate the Floridan aquifer are also open to the intermediate system.

Surficial Aquifer System(*)

In Manatee County, the surficial aquifer system is composed primarily of deposits of sand, gravel, shells, and limestone whose composition may vary laterally and vertically. The deposits comprise the Pliocene to Recent age undifferentiated sands, terrace deposits, and the Bone Valley Formation. In the eastern and central part of Manatee County, the aquifer consists mostly of medium to fine-grained, well-sorted, quartz sand and ranges in thickness from about 10 to 90 feet (Figure 65). Within this area, the sands contain a hardpan layer that consists of sand and carbonaceous and limonitic material that averages about 5 feet in thickness. The hardpan retards vertical flow of water. The sandy clays of the Bone Valley and Hawthorn Formations form the base of the surficial system in eastern Manatee County. In the western part of the county, the system consists of sand, sandy limestone, and shell and ranges from about 1 to 20 feet in thickness. The sandy clays, clays, and marls form the base of the surficial system. A listing of aquifer coefficients derived from aquifer tests of the surficial aquifer system in the SWCFGWB are included in Table 3. Locations of these tests are given in Figure 19. Seasonal fluctuations in the water table are generally less than 5 feet and are generally lowest in April or May and highest in September.

The direction of ground-water flow in the water table is generally west and south in Manatee County. The configuration of the water surface is similar to that of the land surface. Water surface is at sea level along the coast and increases to altitudes of about 130 feet above NGVD in the northeast area of the county. Depth to the water table ranges from zero in coastal and flat, poorly drained areas, to about 10 feet below land surface in topographically high areas. The average depth to the water table is about 5 feet.

In some areas, the surficial aquifer is confined by layers of hardpan, clay, or limestone. Many shallow wells in the county penetrate one or more of these confining layers. Generally, the artesian pressure is insufficient to produce flowing wells (Peek, 1958b). The surficial aquifer supplies the least quantity of water in the county. Small volumes of water are used for domestic use, lawn irrigation, or stock watering. Most wells that tap the surficial aquifer have small diameters and yield less than 50 GPM. Most surficial wells are finished as open holes; some are screened.

Aquifer Properties

The transmissivity of the surficial aquifer in Manatee County ranges from less than 267 to about 5,304 ft^2/d (Table 3). The transmissivity of the thick sand and phosphorite deposits in the south-central part of the county probably ranges from about 1,000 to 2,000 ft^2/d (Brown, 1983). Similar transmissivity was reported by Wilson (1972) and Hutchinson and Wilson (1977a) for surficial deposits in

DeSoto and Hardee Counties. Transmissivity of the surficial aquife in Charlotte County south of Manatee County, that consists of san and interbedded shell and limestone similar to deposits in wester Manatee County, was reported to be about 7,000 ft^2/d (Sutcliffe 1975).

The storage coefficient of an unconfined aquifer is virtually equa to the specific yield, which is commonly determined by laborator drainage tests. In Manatee County, the storage coefficient of th surficial aquifer is 0.05 to 0.12 (Table 3). Similar estimates o storage coefficients based on laboratory specific-yield tests o similar deposits in Polk County (Pride and others, 1966) and i: Hillsborough County (Sinclair, 1974) and on an aquifer test i: southeastern Hillsborough County (Hutchinson, 1978).

Water Quality (*)

The chemical quality of ground water is primarily affected by the quality of rainfall that recharges to the aquifer, types of rocks i: which water is in contact, and length of time water has beer circulating within the aquifers. In Manatee County, the chemica: quality is also affected by intrusion of seawater or the mixing o: relatively fresh water with highly mineralized water, believed to be residual seawater within the water-bearing formations (Peek, 1958a).

Wells that penetrate deep water-bearing zones are commonly constructed with tens to hundreds of feet of open hole and are open to one or more water-bearing zones. Water in each zone has distinctive water-quality characteristics. Thus, the quality of water pumped depends on which zones are tapped and the proportion of water derived from each.

The dissolved mineral content of water from the surficial system in Manatee County varies greatly. Water is generally of potable quality except near the coast and tidally affected streams where saltwater intrusion has taken place.

In northeastern Manatee County, the surficial system is composed of relatively insoluble, quartz sand resulting in water that is low in mineral content and hardness (Figure 66). Dissolved solids concentrations are usually less than 300 mg/L. Concentrations of chloride and sulfate are also low, usually less than 10 mg/L and 5 mg/L, respectively. Most water that is soft and low in mineral content has a relatively low pH.

Near the coast and tidally affected streams, water in the surficial system has concentrations of dissolved solids and chlorides of more than 200 and 50 mg/L, respectively. Concentrations of sulfate vary considerably, but are usually less than 20 mg/L. In many places along the coast, water in the surficial system is highly mineralized, approaching that of seawater. In some low-lying and coastal areas, the surficial system is highly mineralized because of infiltration or intrusion by seawater, leakage from improperly constructed wells, uncapped flowing wells, and irrigation water from wells that contain moderate to highly mineralized water (Joyner and Sutcliffe, 1976). Appendix D and E lists the water quality sampling sites and data utilized to modify and update the water quality maps for Manatee County.

Aquifer Properties(*)

The transmissivity of the Floridan aquifer system ranges from about 4,900 to 160,000 ft^2/d (Table 3). Transmissivity of the dolomite unit of the Avon Park Limestone lower water-bearing zone ranges from about 20,000 to 700,000 ft^2/d. Most production wells, however, are also open to the lower part of the middle zone (Ocala Limestone). In eastern and southeastern Manatee County, the transmissivity of this zone ranges from 60,000 to 150,000 ft^2/d (Brown, 1983). In western Manatee County, the transmissivity of the upper and middle zones is about 15,000 ft^2/d (Peek, 1958a). In northeastern Manatee County, Guyton and Associates (1976) reported an estimated transmissivity of about 3,300 ft^2/d for the Suwannee Limestone and also indicated that little water can be produced from the Tampa Limestone.

The storage coefficients of most confined aquifers range from about 10^{-5} to 10^{-3} and are about 10^{-6} per foot of thickness (Lohman, 1972). The storage coefficient of the Upper Floridan aquifer in Manatee County ranges from 0.0002 to 0.002 (Table 3). Leakance from the surficial aquifer system to the Upper Floridan aquifer where differences in head are favorable could not be determined accurately from aquifer tests. This was due to (1) extreme thickness of the upper confining beds (about 200 to 400 feet), (2) small drawdowns due to high transmissivity of the aquifer, (3) large fluctuations in background water levels due to seasonal irrigation, and (4) short duration of most aquifer tests (less than 30 days). Leakance to the Upper Floridan aquifer is probably less than 10^{-4} (ft/d)/ft and is estimated to range from 0.00004 to 0.0027 (ft/d)/ft. Estimated leakances determined from aquifer tests range from 10^{-6} to 10^{-3} (ft/d)/ft. In northeastern Manatee County, William F. Guyton and Associates (1976) estimated leakance to be about 1.34×10^{-6} to 1.34×10^{-5} (ft/d)/ft.

Water Quality(*)

Water in the Upper Floridan aquifer is generally more mineralized than water from the surficial and intermediate aquifer systems. Mineral content of the water within the aquifer varies vertically and areally. Mineral content of the water generally increases with depth of the aquifer penetrated. Water from wells open to the upper water-bearing zone is generally less mineralized than water from wells open to the middle water-bearing zones. Water from wells open to the lower water-bearing zone or to the full thickness of the aquifer has the highest mineralization.

Dissolved Solids.--Concentrations of dissolved solids in water from the Upper Floridan aquifer range from about 300 to more than 2,500 mg/L in the three major water-bearing zones. Concentrations generally increase with depth and laterally from the northeastern part of the county towards the west and south. Dissolved solids in water from wells penetrating the upper zone exceed 500 mg/L in the western and southern parts of the county (Figure 68a).

Water from wells penetrating the middle zone has dissolved solids concentrations ranging from about 300 to 1,800 mg/L (Figure 68b). In northeastern Manatee County, dissolved solids are less than 500 mg/L, and in the western and southeastern parts of the county, subdued. Figure 5 illustrates east-west and north-south trend cross-sections that depict the topography in the SWCFGWB. Figure illustrates the physiographic regions of the SWCFGWB.

The dominant river basins, ranked in descending stream flow order are the Peace, Hillsborough, Alafia, Shell Creek, Myakka, Horse Creek, and Manatee Rivers. All of these rivers have an average flow greater than 100 cubic feet per second (cfs). The major rivers begin on the Polk Upland and flow west or southwest to the Gulf of Mexico. The major wetland is the Green Swamp but many of the river flood plains are low, wetland strands.

There are numerous second and third magnitude springs in the northern area of the SWCFGWB but south of central Hillsborough and Polk almost no springs exist today. The only three springs reported are Pinehurst, Little Salt, and Warm Mineral Springs, which are all located in Sarasota County. The latter two springs exceed potable standards for salts concentration. Virtually all springflow is derived from the Floridan aquifer system.

The geology, topography, and drainage are all interdependent with water erosion shaping the limestone chemically and mechanically. The karst nature of the limestone results in solution features redirecting runoff underground. The sand and soft limestone supporting the flat to hilly topography was first shaped by beach erosion terracing the sand and stone. Afterwards, weak limestone caverns collapsed and surface erosion reshaped the highland sands. The southern plains and lowlands lack the underground drainage and typical karst topography. Surficial erosion by rivers and transgressive/regressive seas dominate the land forms. Nutrients and fresh water entering the Gulf also supports a large estuary system along the coast.

The SWCFGWB is characterized by karst terrain, in the northern and eastern areas, developed through the dissolution of the underlying shallow sinkholes. Surface drainage is absent or poorly developed in most of these areas, but waters from Hillsborough, Anclote, and Pithlachascotee Rivers flow through well-defined stream channels. Thick clay layers of the Bone Valley, Caloosahatchee, and Hawthorn Formations subdue karst activity in the flat lands of the central and southern SWCFGWB.

CLIMATE

The climate of the SWCFGWB is characterized by long, warm, humid summers and short, mild winters. Average monthly temperatures range from 61° F in January to 82° F in July and August (National Oceanic and Atmospheric Administration (NOAA), 1986). Average annual temperature is 73° F.

Some rainfall normally occurs during each month, but a SWCFGWB high rainfall season extends from June through September and a low rainfall season extends from October through May. The winter rainfall is relatively light because west-central Florida is south of the normal southern limit of winter frontal systems. About sixty percent of the annual rainfall occurs during the rainy season and is derived principally from convectional storms. The Weather Bureau Stations at St. Leo, Bartow, and Punta Gorda were chosen to represent the SWCFGWB. Figure 7 shows the historic median and mean monthly rainfall. Figure 8 depicts the annual total rainfall record for these three weather stations in the SWCFGWB. Spatially, summer rainfall is highly variable; areas only a few miles apart often receive widely differing amounts of rain.

Estimates of evapotranspiration (ET) within the SWCFGWB vary; however, approximately 39 inches per year is generally accepted. Close to sixty percent of the total ET occurs in the six month period from May to October (SWFWMD, 1978). The highest ET rates occur in May and June.

GEOLOGY OF THE BASIN

Overview

The SWCFGWB is underlain by a thick sequence of Cretaceous and Tertiary carbonate rocks overlain by a wedge-shaped sequence of interbedded carbonate and clastic deposits. The principal hydrogeologic units are the surficial, intermediate, and Floridan aquifer systems, as described by the Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1984. The upper one to two thousand feet of the limestones and dolomites that comprise the Floridan aquifer system are considered the Upper Floridan aquifer (Miller, 1982). Table 1 contains the lithologic characteristics and water supply properties of the potable water bearing deposits in the SWCFGWB. Figures 9 and 10 is a hydrogeologic cross-section and a surficial geologic map of the SWCFGWB, respectively.

The Upper Floridan aquifer is a solution-riddled and faulted limestone comprised of chemically precipitated limestones and dolomites that contain shells and shell fragments of marine origin. The system was deposited throughout the Tertiary period. This aquifer system is the principal storage and water conveying component of the hydrologic system in the SWCFGWB. The carbonate units that are hydrologically significant, in ascending order include the Avon Park Formation, Ocala Limestone, Suwannee Limestone, Tampa Limestone, and portions of the Hawthorn Formation that are in hydrologic connection with underlying units. These units range in age from Eocene to Miocene. The Tampa Limestone of Miocene Age is generally thin to absent throughout the northern and eastern areas of the SWCFGWB. In the SWCFGWB the Upper Floridan aquifer may contain one or more inter-aquifer confining beds which, in turn, produce a multi-aquifer system. The system thickens from less than 800 feet in the north to greater than 2200 feet in the south (Figure 11).

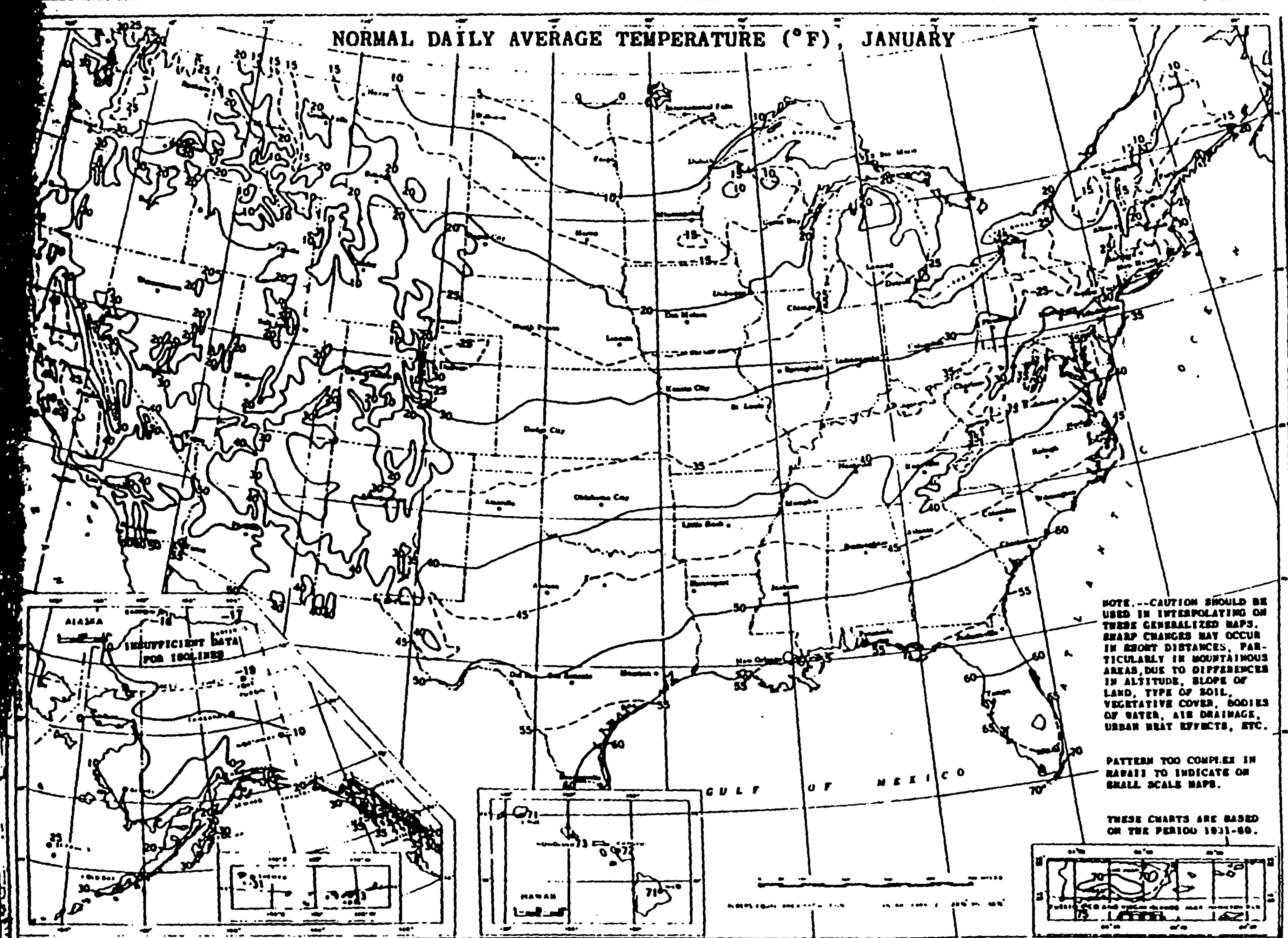
Early in the Miocene Epoch, terrestrial deposits were carried by rivers from the north and intermixed with the upper Tertiary deposits. Clastic deposition continued through the Pliocene and Pleistocene Epochs with phosphatic enrichment of clastic sediments becoming more pronounced. The Hawthorn Formation of Miocene age and the Caloosahatchee, Tamiami, and Bone Valley Formations of Pliocene and Pleistocene age predominately comprise the intermediate aquifer system. In areas of Polk, Manatee, Hardee, DeSoto, Sarasota, and Charlotte Counties, sand and clay beds within the Tampa Limestone are hydraulically connected to the overlying units and are also included in the intermediate aquifer system (Corral and Wolansky, 1984). Units of the intermediate system consist of sand, gravel,

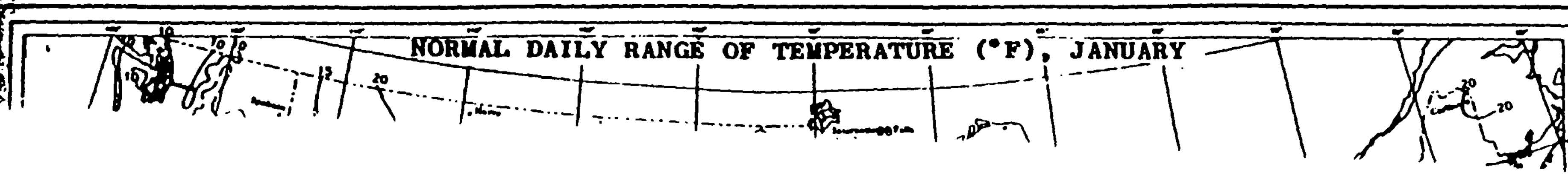
REFERENCE 4

CLIMATIC ATLAS OF THE UNITED STATES

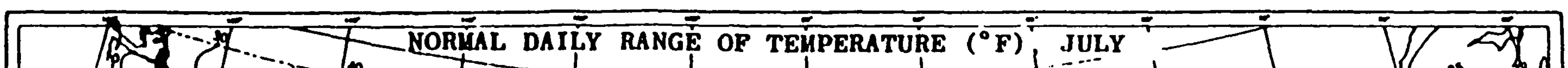
ıtal Science Services Administration • Environmental Data S

ND RANGE OF TEMPERATURE (°F),

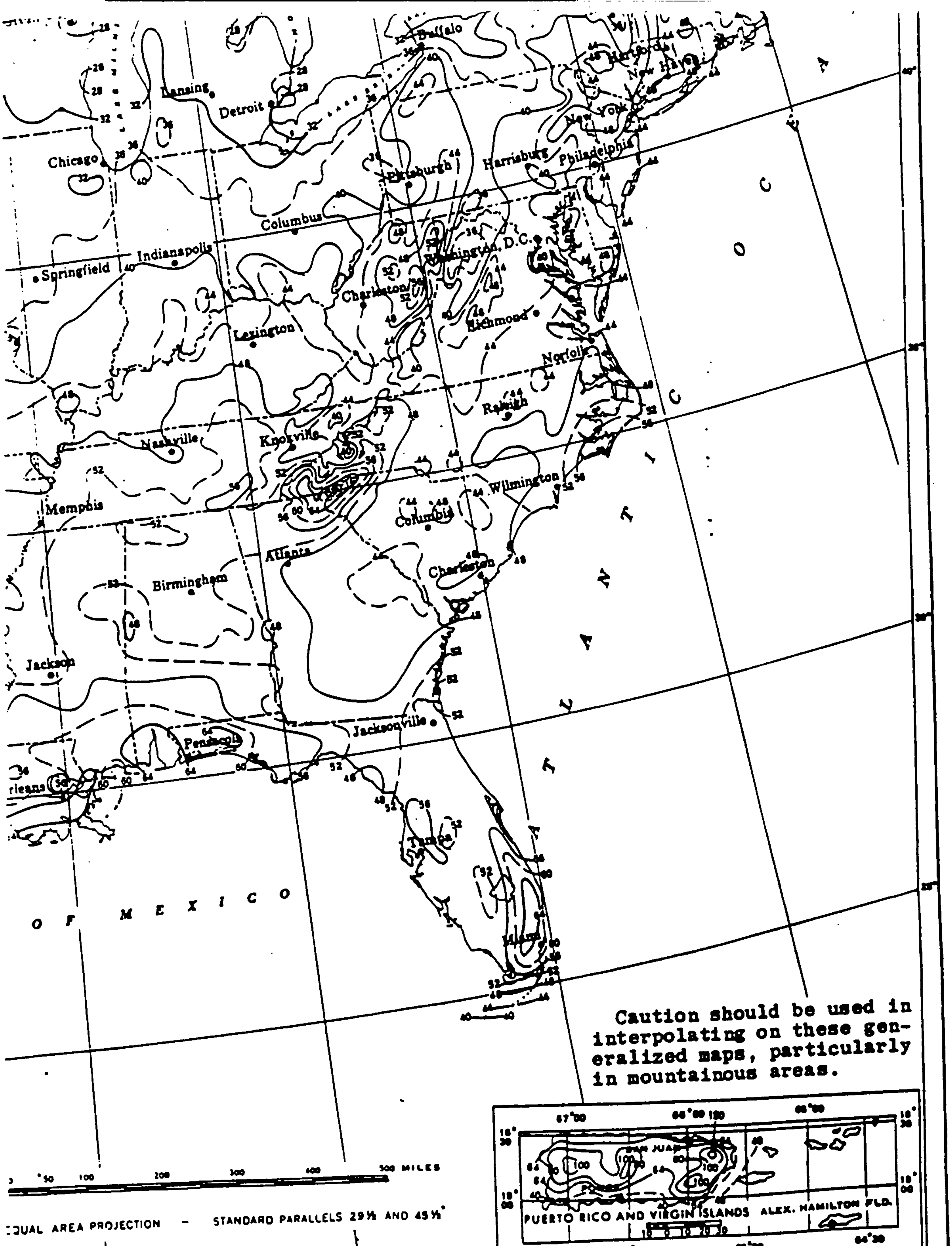




NORMAL DAILY AVERAGE TEMPERATURE (°F), JULY
ALASKA
INSUFFICIENT DATA FOR ISOLINES
HAWAII
GULF OF MEXICO
NOTE.--CAUTION SHOULD BE USED IN INTERPOLATING ON THESE GENERALIZED MAPS. SHARP CHANGES MAY OCCUR IN SHORT DISTANCES, PARTICULARLY IN MOUNTAINOUS AREAS, DUE TO DIFFERENCES IN ALTITUDE, SLOPE OF LAND, TYPE OF SOIL, VEGETATIVE COVER, BODIES OF WATER, AIR DRAINAGE, URBAN HEAT EFFECTS, ETC.
PATTERN TOO COMPLEX IN HAWAII TO INDICATE ON SMALL SCALE MAPS.
THESE CHARTS ARE BASED ON THE PERIOD 1931-60.



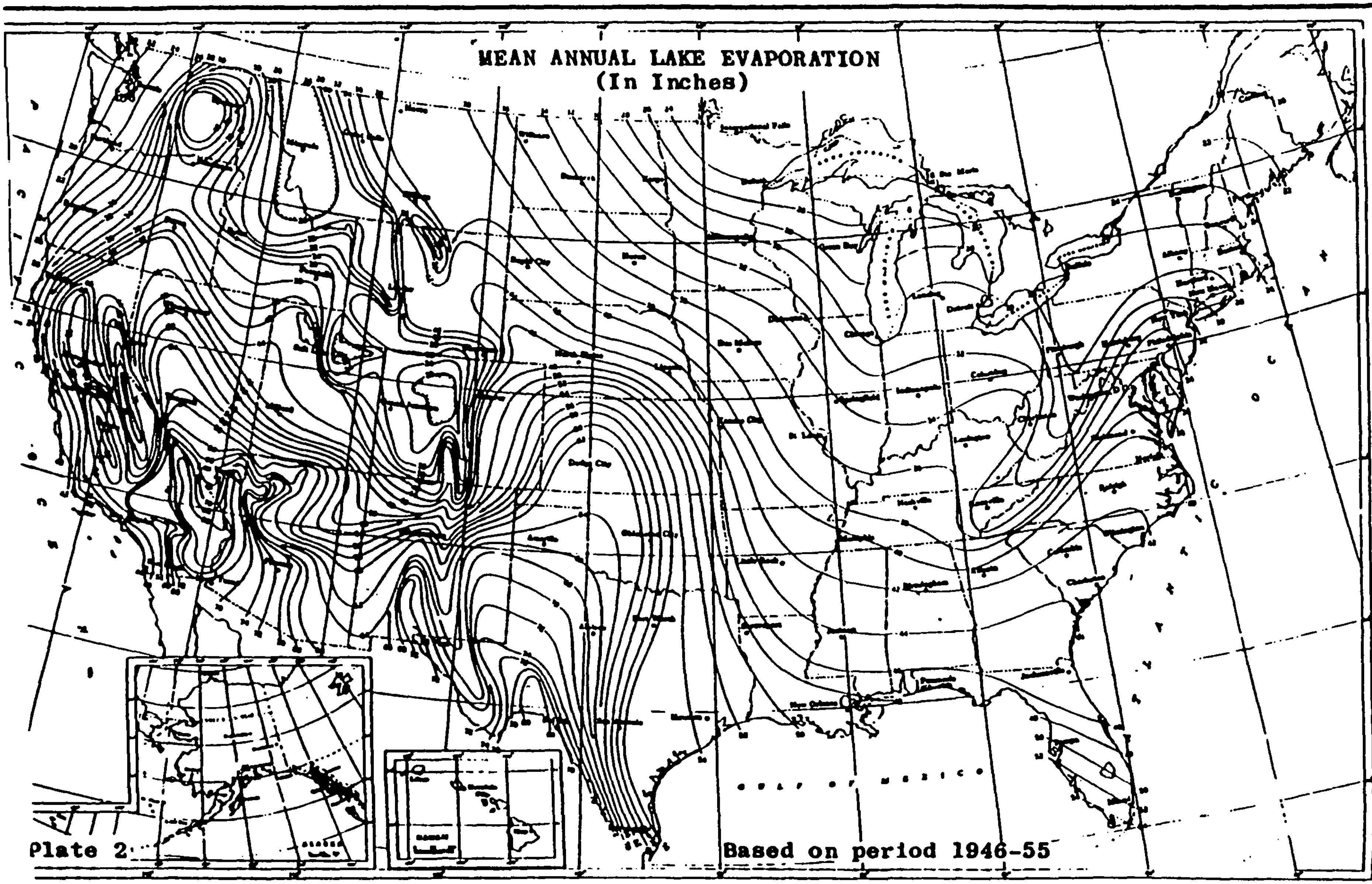
NORMAL DAILY RANGE OF TEMPERATURE (°F), JULY

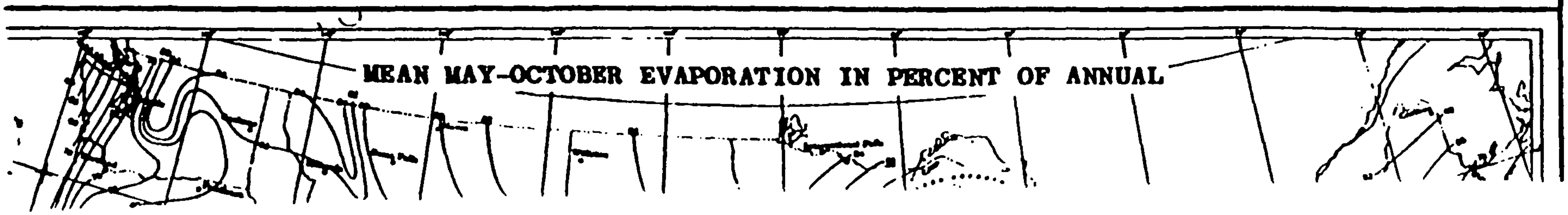


Caution should be used in interpolating on these generalized maps, particularly in mountainous areas.

BASED ON PERIOD 1931-60

ᴬKE EVAPORATION





REFERENCE 5

U.S. DEPARTMENT OF COMMERCE
... H. Hodges, Secretary

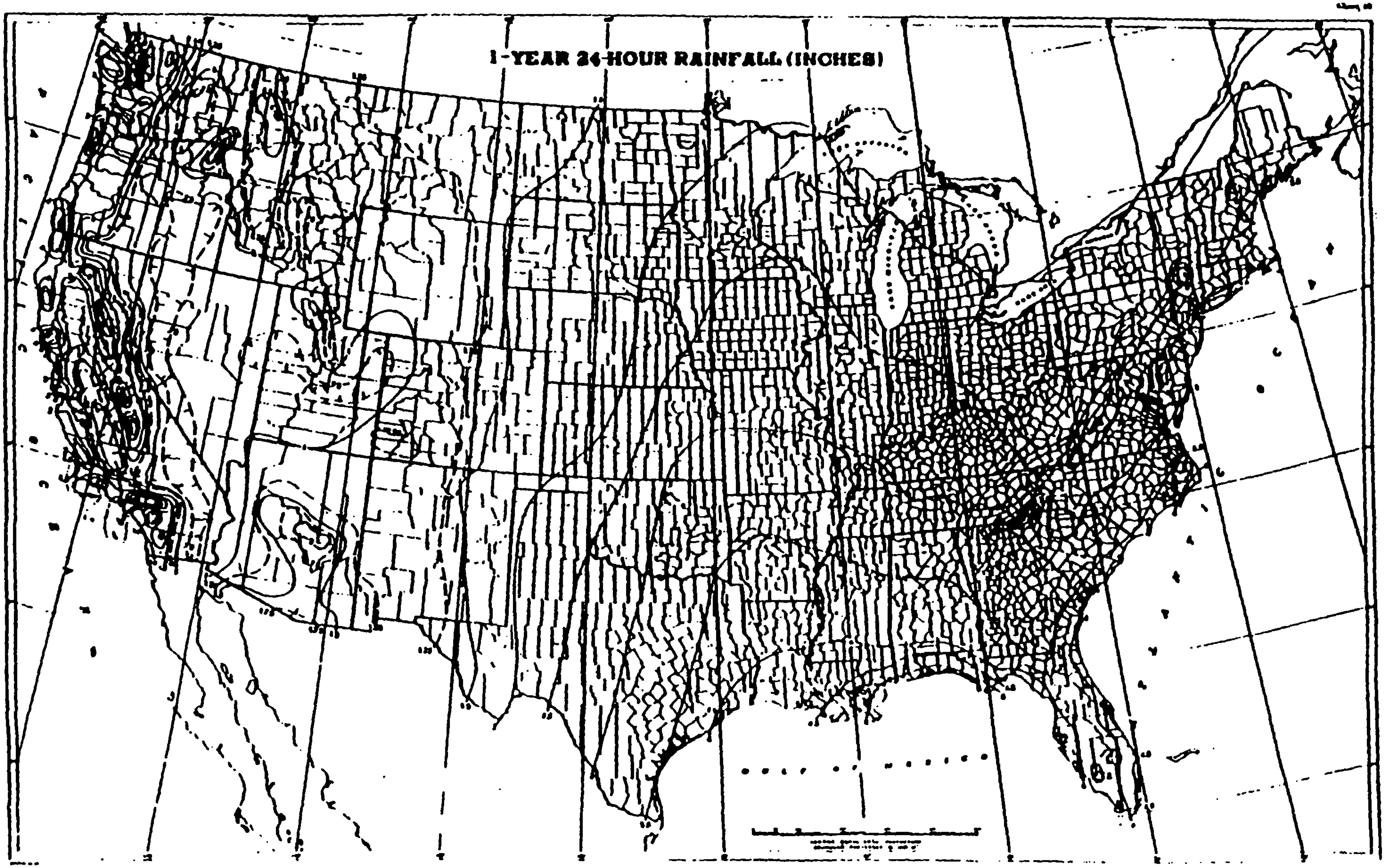
WEATHER BUREAU
F. W. Reichelderfer, Chief

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture


1-YEAR 24-HOUR RAINFALL (INCHES)

REFERENCE 6

GYPSUM STACK STATUS

SOUTHWEST DISTRICT

NOVEMBER 1988

DISCUSSION

As a result of the extraction of phosphate from ore, gypsum (hydrated calcium sulfate) is produced as a byproduct. The gypsum is pumped as a slurry with plant process water to the tops of gypsum stacks for disposal. The plant process water is typically characterized as having a very low pH and high concentrations of arsenic, cadmium, chromium, lead, sodium, fluoride, manganese, iron, sulfate and total dissolved solids (TDS). High levels of radioactive particle emissions are also typical for the plant process water.

Unless the gypsum stack and associated process water cooling pond are underlain by an impervious liner, contaminants are discharged to groundwater. Soils underlying the gypsum stack/cooling pond complexes will have a variable capacity to neutralize the low pH causing a number of the contaminants to precipitate from solution and attenuating the propogation of such contaminants in groundwater.

Of the 15 gypsum stack/cooling pond complexes in the Southwest District, 11 continue phosphate fertilizer production and associated gypsum disposal activities. Four of the 11 active facilities have recently submitted applications to expand their gypsum disposal operations.

With the exception of Gardinier, all gypsum stack facilities were issued permits for groundwater monitoring in September, 1985. The permittees collectively objected to language in their permits which restricted their zones of discharge to the surficial aquifer, and the permits were therefore withdrawn. All permits for groundwater monitoring were reissued in early 1986 except those for C.F. Industries, Central Phosphates, Conserv and Agrico Chemical Company. These facilities had groundwater contamination problems which they wished to resolve prior to applying for a second groundwater monitoring permit. Agrico Chemical Company was issued a permit for groundwater monitoring early in 1987 which provided for an extended zone of discharge. Twelve of the 15 facilities therefore have permits for groundwater monitoring.

All gypsum stack/cooling pond complexes routinely monitor proximal groundwater quality pursuant to approved groundwater monitoring plans. All 15 facilities are "Existing Installations" and are therefore not required to meet secondary drinking water standards at their property boundaries or within the Intermediate or Floridan aquifers unless surface waters or potable wells may be affected.

FACILITY OVERVIEW

C.F. Industries

The facility includes sulfuric acid plants, phosphoric acid plants, diammonium phosphate plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Bartow in Polk County. Operations began at the facility in 1962 and gypsum disposal ceased for a time between 1986 and 1988. Gypsum disposal activities continue at about 25% of plant capacity.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in January, 1984. A permit for groundwater monitoring was issued to C.F. Industries on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A groundwater monitoring permit has never been reissued for this facility. As a result of groundwater violations, C.F. Industries filed a petition for an extended zone of discharge on December 31, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
arsenic	1.8 mg/L	.05 mg/L
cadmium	.51 mg/L	.01 mg/L
chromium	2.8 mg/L	.05 mg/L
sodium	2100 mg/L	160 mg/L
gross alpha	5480 pCi/L	15 pCi/L
combined radium	8.9 pCi/L	5 pCi/L
fluoride	4690 mg/L	2 mg/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
pH	1.5 SU	>6.5 SU
sulfate	4570 mg/L	250 mg/L

A Warning Notice was issued to C.F. Industries during July, 1985 for groundwater quality violations. The issues raised in the Warning Notice were to be resolved by an extended zone of discharge onto adjacent property, however a determination as to the extended zone of discharge is pending the collection of additional data.

Central Phosphates

The facility includes sulfuric acid plants, phosphoric acid plants, granulated triple superphosphate plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Plant City in Hillsborough County. Operations began at the facility in 1965 and expanded in 1975.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in February, 1984. A permit for groundwater monitoring was issued to Central Phosphates on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A groundwater monitoring permit has never been reissued for this facility. An application for an expanded gypsum stack/cooling pond complex was submitted by Central Phosphates on January 19, 1988 and withdrawn on November 4, 1988.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
Cadmium	.022 mg/L	.01 mg/L
chromium	.052 mg/L	.05 mg/L
lead	.09 mg/L	.05 mg/L
sodium	1250 mg/L	160 mg/L
gross alpha	29 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
manganese	12 mg/L	.05 mg/L
sulfate	5500 mg/L	250 mg/L
iron	260 mg/L	.3 mg/L
TDS	10,000 mg/L	500 mg/L

A Warning Notice was issued to Central Phosphates during July, 1985 for groundwater quality violations and a Consent Order was executed in September, 1987. Groundwater problems are now known to occur within the Floridan aquifer beyond the facility property boundary as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	415 mg/L	160 mg/L
gross alpha	29.4 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	2230 mg/L	250 mg/L
iron	30 mg/L	.3 mg/L
TDS	3700 mg/L	500 mg/L
pH	6.37 SU	>6.5 SU

Conserv

The facility includes a sulfuric acid plant, a phosphoric acid plant a diammonium phosphate plant and a gypsum stack/cooling pond complex on approximately 800 acres near Nichols in Polk County. Operations began at the facility in 1953 and expanded in 1962.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in February, 1984. A permit for groundwater monitoring was issued to Conserv on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A groundwater monitoring permit has never been reissued for this facility. An application for an expanded gypsum stack/cooling pond complex was submitted by Conserv on February 16, 1988. It is anticipated that the application for an expansion permit will be withdrawn by Conserv.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
arsenic	.15 mg/L	.05 mg/L
chromium	.22 mg/L	.05 mg/L
sodium	630 mg/L	160 mg/L
gross alpha	50 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	3620 mg/L	250 mg/L
iron	110 mg/L	.3 mg/L
manganese	3.4 mg/L	.05 mg/L
pH	4.3 SU	>6.5 SU
TDS	8760 mg/L	500 mg/L

A Warning Notice was issued to Conserv in June, 1985 for groundwater quality violations. The issues raised in the Warning Notice are to be resolved by execution of an acceptable Consent Order.

Farmland Industries

The facility includes phosphoric acid plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Bartow in Polk County. Operations began at the facility in 1965 and expanded in 1971.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in February, 1984. A permit for groundwater monitoring was issued to Farmland on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on January 31, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
chromium	.066 mg/L	.05 mg/L
sodium	1064 mg/L	160 mg/L
gross alpha	111.9 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
iron	30 mg/L	.3 mg/L
manganese	.38 mg/L	.05 mg/L
TDS	11,000 mg/L	500 mg/L
sulfate	3500 mg/L	250 mg/L

A Warning Notice was issued to Farmland during October, 1987 for groundwater quality violations. A proposed Consent Order is to be issued to Farmland by December, 1988.

Gardinier

The facility includes sulfuric acid plants, phosphoric acid plants, triple superphosphate plants, ammonium phosphate plants and a gypsum stack/cooling pond complex on approximately 2600 acres near Gibsonton in Hillsborough county. Operations began at the facility in 1924 and closure of the existing facility is anticipated by 1990 as construction of a new facility on separate property has recently been permitted.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in January, 1984. A permit for groundwater monitoring was issued to Gardinier on May 19, 1986.

The Department filed a complaint against Gardinier in June, 1988 to address environmental impacts associated with an acid spill which occurred in May, 1988.

Agrico Chemical Company

The facility includes sulfuric acid plants, phosphoric acid plants, a granulated triple superphosphate plant and a gypsum stack/cooling pond complex on approximately 2200 acres near Fort Meade in Polk County. Operations began at the facility in 1955.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in January, 1984. A permit for groundwater monitoring was issued to Agrico on September 10, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on January 30, 1987 which provided for an extended zone of discharge onto adjacent property.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
arsenic	.26 mg/L	.05 mg/L
sodium	1146 mg/L	160 mg/L
gross alpha	152.4 pCi/L	15 pCi/L
combined radium	34.2 pCi/L	5 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	2900 mg/L	250 mg/L
TDS	7046 mg/L	500 mg/L

A Warning Notice was issued to Agrico during July, 1985 for groundwater quality violations. The issues raised in the Warning Notice were resolved by extending the facility zone of discharge onto adjacent property.

American Cyanamid

The facility included a sulfuric acid plant, a phosphoric acid plant, a triple superphosphate plant and a gypsum stack/cooling pond complex on approximately 300 acres near Fort Meade in Polk County. Operations began at the facility in 1957 and ceased in 1971.

A groundwater monitoring plan was submitted to the Department in September, 1983 and approved in March, 1984. A permit for groundwater monitoring was issued to American Cyanamid on June 8, 1984 and subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on April 30, 1986.

Eleven of the 15 gypsum stack/cooling pond complexes are reportedly violating primary drinking water standards within the surficial aquifer at their property boundaries, and/or within the Intermediate or Florida aquifers. Groundwater quality investigations at 6 of these 11 facilities are currently being conducted through various enforcement mechanisms. As mentioned previously, groundwater quality violations at the Agrico Chemical facility have been addressed by modifying their groundwater monitoring permit to provide for an extended zone of discharge onto adjacent property.

All 15 gypsum stack/cooling pond complexes may be expected to leach contaminants to groundwater for a period of 50 years or more following the cessation of gypsum disposal activities. Appropriate site closure may help to minimize the spread of contaminants to proximal groundwater or surface water. Innovative uses of the remaining gypsum such as incorporation into building materials or road bed materials may also be encouraged during site closure.

Solid waste statutes which became effective October 1, 1988 require that all facilities disposing of their own solid waste on their own property after that date address groundwater discharges through an appropriate permit. The extent to which other solid waste rules, such as those requiring impervious liners, site closure and financial assurance, may apply to gypsum stacks is unclear.

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	2615 mg/L	250 mg/L
TDS	6144 mg/L	500 mg/L
iron	21.8 mg/L	.3 mg/L
manganese	.46 mg/L	.05 mg/L
pH	6.1 SU	>6.5 SU

Royster, Piney Point~~(formerly AMAX)~~

The facility includes sulfuric acid plants, phosphoric acid plants, ammoniated fertilizer plants and a gypsum stack/cooling pond complex on approximately 300 acres in Manatee County. Operations began at the facility in 1966 and expanded in 1978.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved sometime thereafter. A permit for groundwater monitoring was issued to AMAX on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on March 14, 1987, following the collection of additional information.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	180 mg/L	160 mg/L

Secondary Drinking Water Standards

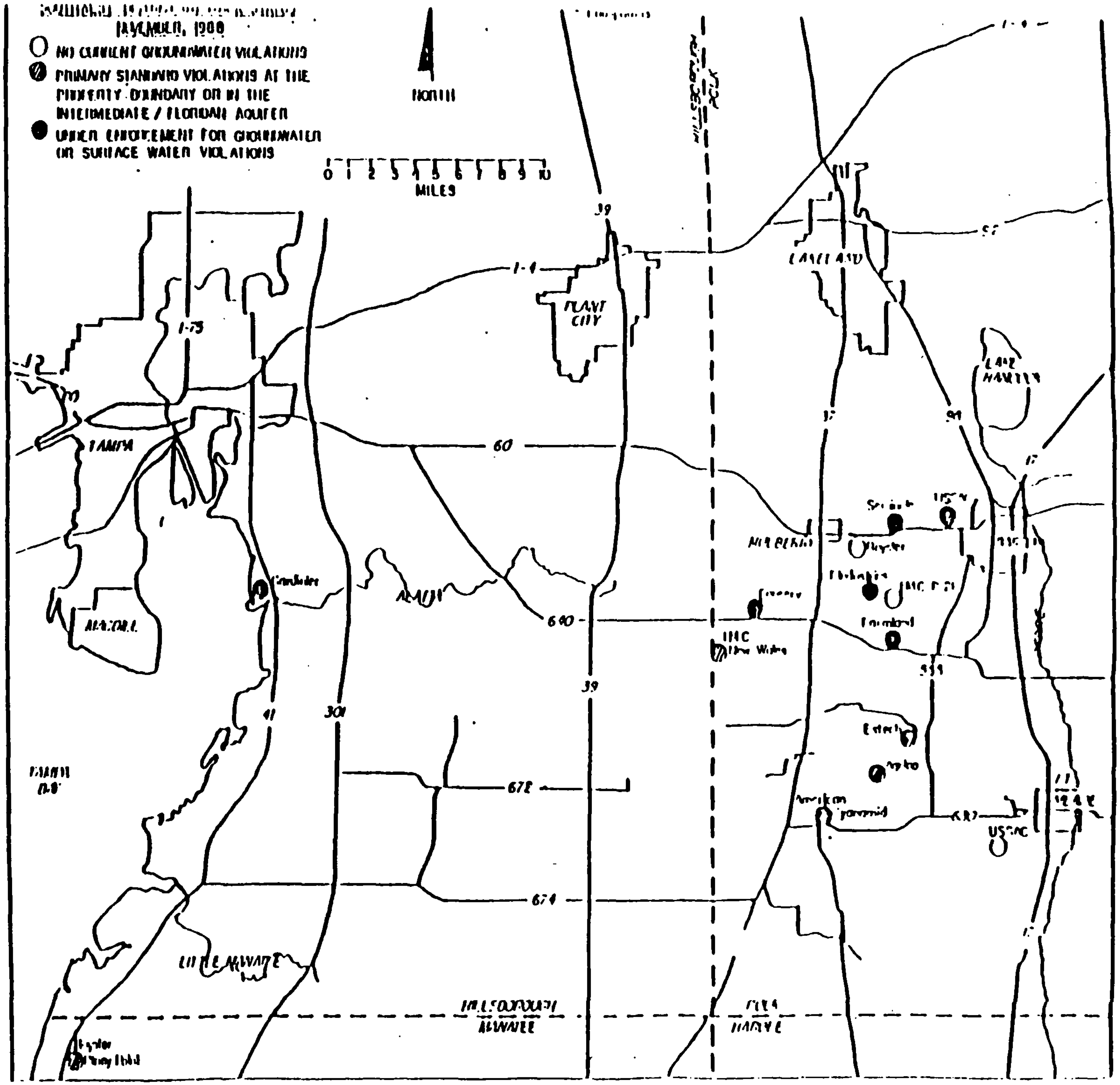
Contaminant	Concentration	Standard
sulfate	745 mg/L	250 mg/L
TDS	1586 mg/L	500 mg/L
manganese	.31 mg/L	.05 mg/L
iron	2.9 mg/L	.3 mg/L

Whether contaminants reported at Royster, Piney Point may be attributed to proximity to Tampa Bay is unclear.

Seminole Fertilizer (formerly W.R. Grace)

The facility includes sulfuric acid plants, granulated triple superphosphate plants, phosphoric acid plants, diammonium phosphate plants and two gypsum stack/cooling pond complexes on approximately 2000 acres near Bartow in Polk County. One gypsum stack/cooling pond complex is located north of SR 60 adjacent to the fertilizer plant, and the other gypsum stack/cooling pond complex is located south of SR 60. Operations at the north gypsum stack began in 1954 and operations at the south gypsum stack began in 1965.

Facility Name	Active	Inactive	Intermediate or Floridan Aquifer: Primary and Secondary Violations	Intermediate or Floridan Aquifer: Secondary Violations Only	Surficial Aquifer: Primary and Secondary Violations	Surficial Aquifer: Secondary Violations Only	Enforcement Action Initiated	Potable Wells Within 1/2 Mile	Expansion Permit Applications: Issued	Expansion Permit Applications: Withdrawn	Extended Zone of Discharge
CF Industries	X				X		X				
Central Phosphates	X		X		X		X	X		X	
Conserv	X				X		X	X			
Farmland Industries	X				X		X	X			
Gardinier	X						X				
Agrico Chemical	X				X		X				X
American Cyanamid		X			X						
IMC New Wales	X		X								
Royster, Piney Point	X				X						
Seminole Fertilizer	X		X		X		X	X			
USSAC, Bartow		X			X			X			
USSAC, Fort Meade	X					X		X			
Estech		X			X						
IMC P-21		X				X					
Royster, Mulberry	X					X			X		


NOVEMBER, 1988
NO CURRENT GROUNDWATER VIOLATIONS
PRIMARY STANDARD VIOLATIONS AT THE PROPERTY BOUNDARY OR IN THE INTERMEDIATE / FLORIDAN AQUIFER
UNDER ENFORCEMENT FOR GROUNDWATER OR SURFACE WATER VIOLATIONS
NORTH
0 1 2 3 4 5 6 7 8 9 10
MILES
TAMPA
PLANT CITY
LAKELAND
60
39
301
41
I-75
I-4
640
672
674
17
HILLSBOROUGH
MANATEE
POLK
HARDEE
USAC

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved sometime thereafter. A permit for groundwater monitoring was issued to W.R. Grace on September 10, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued to W.R. Grace on April 15, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	759 mg/L	160 mg/L
gross alpha	80 pCi/L	15 pCi/L
combined radium	14.4 pCi/L	5 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	2012 mg/L	250 mg/L
TDS	4284 mg/L	500 mg/L
iron	245 mg/L	.3 mg/L
manganese	.25 mg/L	.05 mg/L

A Warning Notice was issued to W.R. Grace on March 3, 1988 for violations of groundwater quality standards. Subsequently, contaminants were discovered in nearby potable wells as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
arsenic	.075 mg/L	.05 mg/L
lead	.181 mg/L	.05 mg/L
sodium	176.7 mg/L	160 mg/L
gross alpha	59 pCi/L	15 pCi/L
combined radium	18.8 pCi/L	5 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	606 mg/L	250 mg/L
TDS	831 mg/L	500 mg/L
iron	29.6 mg/L	.3 mg/L

The potable wells have recently been replaced with city water, and a proposed Consent Order is to be issued to W.R. Grace by December, 1988.

USSAC, Bartow

The facility includes a sulfuric acid plant, a phosphoric acid plant, a diammonium phosphate plant and a gypsum stack/cooling pond complex on approximately 1000 acres near Bartow in Polk county. Operations began at the facility in 1946 and ceased in 1981.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved sometime thereafter. A permit for groundwater monitoring was issued to USS Agrichemical on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on June 19, 1986.

Groundwater quality problems have been reported in the surficial aquifer as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	245 mg/L	160 mg/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	1332 mg/L	250 mg/L
TDS	3131 mg/L	500 mg/L
manganese	.59 mg/L	.05 mg/L

USSAC Fort Meade

The facility includes sulfuric acid plants, phosphoric acid plants, triple superphosphate plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Fort Meade in Polk County. Operations at the facility began in 1961.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved sometime thereafter. A permit for groundwater monitoring was issued to USS Agrichemical on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on July 14, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
iron	11.4 mg/L	.3 mg/L
manganese	.12 mg/L	.05 mg/L

Estech

The facility began operation in 1948 and ceased operation in 1968. Little information is available in Department files as to the nature of the facility operation.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in August, 1984. A permit for groundwater monitoring was issued to Estech on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on May 19, 1986.

Groundwater quality problems have been reported in the Intermediate aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
gross alpha	26.2 pCi/L	15 pCi/L
combined radium	13.6 pCi/L	5 pCi/L

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	441 mg/L	160 mg/L
gross alpha	54.1 pCi/L	15 pCi/L
combined radium	14.3 pCi/L	5 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	1860 mg/L	250 mg/L
TDS	3300 mg/L	500 mg/L
iron	18 mg/L	.3 mg/L
manganese	1.1 mg/L	.05 mg/L

IMC P-21

The facility was in operation during the late 1950s and early 1960s, and little information is available as to the nature of past operations.

A groundwater monitoring plan was submitted to the Department in March, 1985 and was approved in May, 1985. A permit for groundwater monitoring was issued to IMC on September 11, 1985, and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on March 11, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	1431 mg/L	250 mg/L
TDS	2175 mg/L	500 mg/L
iron	125.4 mg/L	.3 mg/L
manganese	.78 mg/L	.05 mg/L

Royster, Mulberry

The facility includes sulfuric acid plants, phosphoric acid plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Mulberry in Polk County. No records are available as to when operations began at the facility.

A groundwater monitoring plan was submitted to the Department in December, 1983 and was approved in January, 1984. A permit for groundwater monitoring was issued to Royster on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on July 9, 1986. An application for a construction permit to expand the gypsum stack/cooling pond complex was submitted to the Department in April, 1987, and a construction permit for the expansion was issued to Royster in March, 1988.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
iron	5.9 mg/L	.3 mg/L
pH	5.8 SU	>6.5 SU

No problems have been reported for the Intermediate aquifer monitor wells, however the well completion reports indicate that the Intermediate aquifer monitor wells are in fact completed in the Florida aquifer. Thus no monitor wells have been installed so as to monitor groundwater quality in the Intermediate aquifer.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	258.9 mg/L	160 mg/L
gross alpha	30.3 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	1424 mg/L	250 mg/L
TDS	4292 mg/L	500 mg/L
iron	45.6 mg/L	.3 mg/L
manganese	1.36 mg/L	.05 mg/L

Enforcement action has not been initiated against American Cyanamid.

IMC New Wales

The facility includes sulfuric acid plants, phosphoric acid plants granulated triple superphosphate plants and a gypsum stack/cooling pond complex on approximately 1600 acres near Nichols in Polk County. Operations began at the facility in 1975.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in February, 1984. A permit for groundwater monitoring was issued to IMC on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on March 19, 1986. An application for an expanded gypsum stack/cooling pond complex was submitted by IMC on August 31, 1988.

No groundwater problems have been reported in the surficial aquifer at the facility property boundary. The following groundwater problems have been reported for the Intermediate aquifer, however the appropriateness of the monitor well construction is in question:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	1030 mg/L	160 mg/L
gross alpha	20 pCi/L	15 pCi/L
combined radium	15.2 pCi/L	5 pCi/L

REFERENCE 7

CONSOLIDA

FEED SUPPLEMENT DIVISION

September 16, 1987

Mr. Sam Sahebzamamni, P.E.
Industrial Waste Programs
Department of Environmental Regulations
4520 Oak Fair Boulevard
Tampa, Florida 33610-7347

Dear Mr. Sahebzamani:

In accordance with the terms of Permit I041-129068A, we are tra herewith the third quarterly report for 1987 of the groundwate wells at Piney Point. All the wells exceed the MCL for severa secondary parameters. With exception of well no. 6, the MC primary parameters were generally not exceeded.

As pointed out in the letter transmitting the report in Ju is an apparent contamination problem with well MW-6, several p have high values. To repeat - this well is 65 feet deep, ca feet. The casing may have a break causing contamination. is located very close to a deep seepage ditch which could have on the results experienced. We again propose that MW-6 be plugged and that another location be selected to monitor the in aquifer.

As mentioned previously, we are anxious to pursue a solutior your concurrence to select a different site for a new MW-6 look forward to your reply.

Yours very truly,

John G. Cladakis

John G. Cladakis
Senior Vice President a
Operations Manager
Piney Point Complex

mp

cc: Mr. W. L. Priesmeyer
Mr. B. V. Galloway
Mr. B. Harrison

P.O. Box 790 • Plant City, Florida 34289-0790 • Phone (813) 7

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

MS # 4041A13768

Sample Date 7/29/

Monitoring Well # 4

Well Type: [ ] Backg
[ ] Site
[ ] Inte
[ ] Compl
(x) Sur

Well Name MW-4

Classification of Groundwater G-II

Well Developed* Prior to Sample Collection (Yes/No) YES

Water Level from Top of Pipe

PRIMARY STANDARDS

STORET Code	Parameter Monitored	Sampling Method	Analysis Method	Analysis Result	Units	Sample Filtered/Unfiltered
	Arsenic	(1)	(2)	< .01	mg/1	unfiltered
	Cadmium	(1)	(2)	.00	mg/1	unfiltered
	Chromium	(1)	(2)	.02	mg/1	unfiltered
	Lead	(1)	(2)	.02	mg/1	unfiltered
	Nitrate (ASN)	(1)	(2)		mg/1	unfiltered
	Sodium	(1)	(2)	35.0	mg/1	unfiltered
	Fluoride	(1)	(2)	1.3	mg/1	unfiltered
	Gross Alpha	(1)	(2)	< 2.0	pCi/1	unfiltered
	Ra226	(1)	(2)	N.R.	pCi/1	unfiltered
	Ra228	(1)	(2)	N.R.	pCi/1	unfiltered
	Secondary Standards					
	Chloride	(1)	(2)	57.0	mg/1	unfiltered
	Color	(1)	(2)	105.0	cl-pt	unfiltered
	Copper	(1)	(2)	.01	mg/1	unfiltered
	Iron	(1)	(2)	.60	mg/1	unfiltered
	Manganese	(1)	(2)	.06	mg/1	unfiltered
	pH	(1)	(2)	6.1		unfiltered
	Sulfate	(1)	(2)	162.0	mg/1	unfiltered
	TDS	(1)	(2)	726.0	mg/1	unfiltered
	Zinc	(1)	(2)	.01	mg/1	unfiltered
	Corrosivity	(1)	(2)	+1.3	Langelier	unfiltered
	Foaming agents	(1)	(2)	-	MBAS	unfiltered
	Odor	(1)	(2)	N.O.		unfiltered

*Well development is the process of pumping the well prior to sampling in order t representative ground water sample.

Form 17-1.216(2)
Effective January 1, 1983

N.R. = Not Required

State of Florida
DEPARTMENT OF ENVIRONMENTAL

REFERENCE 8

Interoffice Mem

For Routing To Other Than The A
To: Richard Garrity Location:
To: Sam Sahebzamani Location:
To: Location:
From: Al Bishop Date:

TO: Sam Sahebzamani
Southwest District

THROUGH: Richard Garrity
Southwest District

Richard Harvey
Division of Water Facilities

FROM: Al Bishop
Point Source Evaluation Section

OCT 05 1988
SOUTH WEST DISTRICT
TAMPA

Sam what

DATE: September 28, 1988

SUBJECT: WQBEL for Royster Phosphate Piney Point Facility (formerly CM
(Manatee County)

We were recently contacted by Mr. Ivan Nance of Royster Phosphates, Inc informed us that Royster had purchased the Consolidated Minerals, Inc. Piney Point facility. He said that he wanted to reinitiate the WQBEL L analysis for the Piney Point discharge because Royster would like to be permitted to discharge from outfall 003 at "normal" high flow condition had earlier terminated WQBEL development for the Piney Point discharge request of CMI who had agreed to a modification of their permit (I041-1 to only allow discharge following back to back 25 year storm events. I of the Level II analysis, we had recommended that the operating permit amended to require CMI to provide rainfall data from the Ruskin weather each time they reported a discharge from 003.

In light of Mr. Nance's request to reinitiate WQBEL development, we now recommend that the permit remain in effect without modification. As st in the permit, Royster is now proceeding with the WQBEL development pro should be allowed to discharge at the limits specified in the permit.

We have already been in contact with Royster's consultant, Conservation Consultants, Inc. (CCI), and have discussed at length both the data and modeling requirements for the WQBEL study. Daryll Joyner of my staff m site visit on September 7, 1988 to survey the receiving waters and to h with plan of study development. CCI is currently writing a draft plan for our review. We will provide you with a copy of the draft plan when available and will keep you apprised of all progress on the project.

If you have any questions or comments regarding the Level II analysis, call me or Daryll Joyner at Suncom 278-0780.

AB/DJ/cc

REFERENCE 9

"Rite in the Rain"
WEATHERPROOF

LEVEL

NOTEBOOK NO. 311

FI-2582

AmAX Phosphate

TDD: F4-9609-01

Palmetto, Manatee County, Florida

P.M.: Maureen Gordon

LOGBOOK REQUIREMENTS
REVISED - NOVEMBER 29, 1988

NOTE: ALL LANGUAGE SHOULD BE FACTUAL AND OBJECTIVE

1. Record on front cover of the Logbook: TDD No., Site Name, Site Location, Project Manager.
2. All entries are made using ink. Draw a single line through errors. Initial and date corrections.
3. Statement of Work Plan, Study Plan, and Safety Plan discussion and distribution to field team with team members' signatures.
4. Record weather conditions and general site information.
5. Sign and date each page. Project Manager is to review and sign off on each logbook daily.
6. Document all calibration and pre-operational checks of equipment. Provide serial numbers of equipment used onsite.
7. Provide reference to Sampling Field Sheets for detailed sampling information.
8. Describe sampling locations <u>in detail</u> and document all changes from project planning documents.
9. Provide a site sketch with sample locations and photo locations.
10. Maintain photo log by completing the stamped information at the end of the logbook.
11. If no site representative is on hand to accept the receipt for samples, an entry to that effect must be placed in the logbook.
12. Record I.D. numbers of COC and receipt for sample forms used. Also record numbers of destroyed documents.
13. Complete SMO information in the space provided.

We the undersigned have received, read and understand the Study Plan, Health and Safety Plan and Work Plan for the Screening Site Inspection Phase II for AMAX Phosphate in Palmetto, Florida.

Maureen Gordon Maureen Gordon

Mark Adams Mark Adams

Terry Sawyer Terry Sawyer

Andy Spaugh

Rod Young

October 16, 1990
We arrived at AMAX at 810. It was sunny and 75°F

I met with Mr. Ivan Nance. He informed me that drilling was not possible without a permit + Fl. licensed driller. We can hand-auger.

Hard hats and safety glasses are required in area of plant. He said that they would accept no liability for us.

Ivan Nance, Environmental Supervisor

M. [illegible]

10/16/90
"... of phosphate industrial sites on ... quality in central Florida 1979 to 1980"
USGS
Water-Resources Invest. Report 83-4256

Fl. Dept Env. Reg
USEPA
R. Miller H. Sutcliffe, Jr.
Tal., Fl. 1198[illegible]

Water Quality and Hydrogeologic Data for 3 PO4 Industry Waste Disposal Sites in Central Florida, 1979-80
USGS
Water Resources 81-84

Publications on PO4 file.
to copies

M. [illegible]

3

4

10/16/90

Report to Congress on Special Waste from Mineral Processing

Summary and Findings
Methods and Analysis
Appendice

Solid Waste and Emergency Response
$40.00 & $32.00
EPA/530-SW-90-070C
July 1990 : PB-90-236-492
(703) 487-4650

40CFR, Part 61, Subpart R,
Natl. Emission Standard for Hazardous Air Pollutants (NESHAP)
Radon Emissions Standards ~~for Hazardous Air Pollutants~~ from Phosphogypsum Stacks
(54 FR 51654, Dec. 15, 1989;
FR 13480, Apr 19, 1990; FR
Apr 19, 1990 ... 13482

10/16/90
Polk County Waste ... County ... Employee 174.

Royster sold the ... to a joint venture company — closing by Nov. 1

Atlantic Fertilizer Co. Joint venture with Gulf Atlantic and Royster. Royster will manage.

Ore ... from Hillsborough County.

2500 Tons of PO_4^{-3} is used per day.

2000 tons of H_2SO_4/day ... is used in ... need to buy more.

Mulberry ...

5

10/16/90

$H_3PO_4 + NH_3 \rightarrow$

001, 003 are not used anymore. They are permitted but not used

001 — Sept. 1988 last time ~~Sept~~

003 — March 1984 last time

002 — Always used Non processing Water.

Industrial Waste Water File in Tampa Public Access — where AMAX files are located.

M. [illegible]

10/16/90

Set up equipment Cross of [illegible] outside of the gate.

9:15

Monitor [illegible] Background #22294 20 cpm, 0.02 mR/hr

HNu #801667 4.2

Span 9.8 | PPM 54 | Probe 10.2

OVA Standardized 9:30 100% methane

690822 - Deca

serial 51001

pH meter # 690874

Std. 7.0, 4.0, 10.0

Royster Phosphates Inc. Phosphoric Production complex Piney Point

M. [illegible]

17

8

12/10/90
Tour of facility
with Ivan [illegible]
600 acres.

pH is checked
continually.

Acid storage tanks
around chemical
plant 6000 tons H_2SO_4
98.5% H_2SO_4
2300 tons/day used.

Most likely contam.
~~Heavy~~ Metals, Uranium.
Rock is granular
and dark brown.

Gypsum is transported
in slurry. Some dissolved
~~metals~~ from acid.
In plant area
M-4 0.06 mR/hr
Reading at stack.

M Gardner

12/10/90
Anhydrous NH_3 stored
outside in horizontal
tanks.

All chemical spills of
chemicals are released.
Fire Dept [illegible]

54% H_3PO_4
Underground pipes
within chem plant area.

Underground cables
around power [illegible]

Process water pH 1.8-2.0
Sprays onto gypsum
stack.

[illegible] pH 1.8-2.0

Cave outside fence
north side. Bent.

M Gardner

9

12/16/90
300 acres gypsum

Bee hives East of stack
tired a few daisies

#1 and #2 Background
#3 ... #5

Buckeye Rd.
Orange Grove - Scotti

Fence line property.

French drain empties
into ditch by old
stack (most soluble)

Port Manatee. Due
west.
Gulf - W or SW

Tidal surge hemicast
to 41.

M. [illegible]

12/16/90
Trelections - Turbine
part, jet engines,
West across, #1

Zone - Heavy Industrial
Agriculture

F in water kills
vegetation.

Cooling water is
sprayed for evap.

Water stored on top
of stack for evap

Cement storage Eastern
on Coast.

On gypsum - M + 1,580 K/hr

Again - no reading

M. [illegible]

10/16/90
About 30 ft along
South of plant
Scar concrete slab.

House west of plant
old man on-farm
property. Phone disconnected

South side of property
not fenced. Post chain
link, guardhouse.
001 and 003 to
ditch. To the ditch
then south, finally
to harbor. Drainage
from groves.
Lead Arsenate was
used in sprays at
one time in groves.

Rich Lo...

10/16/90
MW data in logbook
F4-2583

Three N's of Buckeye Rd
is farmland and swampy.
Looking for Curiosity Co.
Gray dirt from east
of AMAX - look for
creek.
1200
We reached Curiosity
Co. Manager of Theft
Farm took us. He
pointed out that it is
flowing from AMAX
toward N. We
were on Hills/Manatee
Cty border.

Temp. 85°, sunny.

Swampy area surrounding
AMAX. Stream intermittent.

... Loosle

14 6/16/90

Since Need background not affected by facility will go to River even though not connected with drainage pathway, it is completely upgradient.

Cunaocity Co. also flows into Cockroach so Cockroach is also downgradient from AMAX

About 1/3 trees in area of plant are dead.

Boats seen in all waterways. Many marinas in 2 counties.

M [illegible]

6/16/90

No sunny 75°F

When we arrived at the site, smoke was emitting from all of the stacks in the plant.

815

M-4 #689357
Bkgd 0.04 mR/hr

HNU SH 801661 DH 683205
9.8 span, 0-200
54 ppm with std

OVA SH 51001 DH 69082

pH meter 6981 #69084
Std. 7.0, 4.01, 9.98 - pH

M [illegible]

15

16 10/16/90

Code	Location	Comments	Time
AP-SW-01	Little Manatee R. North bank East of Hwy. 41	[illegible] Manatees & Dolphins in R. [illegible]	13[illegible]
AP-SD-01	Sarasota Park Dr. Riverside [illegible] Park	[illegible]	[illegible]
AP-SD-02	Cabbage Slough [illegible] Co. 1.5 mi SE of [illegible] N side of SR 683 W of Hwy 75	[illegible]	[illegible]
AB-SD-02	" "	B[illegible] [illegible]	1420
AP-SS-01	[illegible]	[illegible]	[illegible]
AP-SS-01	Same Location as AP-SD-01	[illegible]	1535

M. [illegible]

M. [illegible]

17

10/16/90

Codes	Location	Comments	Time
AP-[illegible]-01	[illegible]	[illegible]	[illegible]
10/17/90		10/17/90	
AP-PW-01	Paul Quinn Rt 1 Box 398B Palmetto, Florida 34221	This well supplies the [illegible] home and a [illegible] co. [illegible] Conductivity 1030 1070 1070 pH 7.2 7.33 7.33 Temp 25.0 25.0 24.0 Sample at [illegible]	9:20 9:25 9:30
AP-SS-02	Located at same place as AP-PW-01	[illegible] black on readings on OVA	09:25
AP-SB-02	Located at same place as AP-PW-01 & AP-SS-02	4 ft [illegible] light brown sand [illegible] no readings on OVA	09:45
AP-TW-02	Located at same place as AP-PW-01 & AP-SS-02 & AP-SB-02	New approx. a feet [illegible]	[illegible]

M. [illegible]

[illegible]

11

20

12/F ... Sampling ...

Code	Location	Comments	Time
AP-SD-11	Ammonia Removal Pond. [illegible] west end	Collected at the North of cathodic pond. Collected in [illegible] clean of algae	14[illegible]
HP-SD-11	" "	Light gray, clay-like	15:05
AP-SW-04	East End cooling pond,	water [illegible]	15:15
AP-SD-01	"	Black rocky, [illegible] [illegible]. Foam on water. [illegible] [illegible] Water from [illegible] [illegible] [illegible]	15:35

[illegible] [illegible] [illegible] 21

22

Sample Code	Location	Sample Comment	Time
NE SW-03	[illegible] and NE [illegible] discharge [illegible] on [illegible] [illegible] [illegible]	[illegible] [illegible] and [illegible] [illegible]	
AP-SW-04	Concrete Bulkhead and Hwy 41 in drainage canal	Algae [illegible] growing small tadpoles [illegible] farmland small fish	1620
AP-SD-04	Since there is a fence sample collected near the [illegible] location	Brown sand - gravel [illegible] Grass spot [illegible] collected	1630
AP-SW-05	Confluence of drainage ditch and Bishops Creek	Drainage canal [illegible] along [illegible] to Bishops [illegible] [illegible] [illegible]	1645
AP-SD-05	RE runs parallel to ditch [illegible] [illegible] side [illegible] of Northern Hwy.	[illegible] [illegible] [illegible] People fish from creek (J. Nance)	163[illegible]

[illegible]

23

10/17/01

Then [illegible] around [illegible] [illegible].

Reeder Farms
Reeder Ranch and [illegible]
10608 U.S. 41 N
Palmetto, FL 34221

Wants test results.
Owns lots of land including airport, dairy, grove including land 4 trailers in SE corner of AMAX

[illegible]

[illegible] Newspaper, [illegible] specialist [illegible] etc.
[illegible] supervised [illegible] Looks [illegible].

M. Costa

10/18/90

Photo

Code	Location	Comments	Time
Reading	out - none		
M-4	0.04 mR/hr		
AP-SS-05	West of cooling pond between ditch and rainwater pond. 25' from ditch. 50' East of Hwy 41	Brown soil water in ditch track, some foam. Dead vegetation along ditch	~~[illegible]~~ 900
AP-SB-05	out 6 ppm at 10'	Collected at zone of saturation. 10' bls Tan sand	910
AP-TW-05	" "	Collected 10' bls	920

HF is a by-product in sprayers on [illegible] still used - is not treated. Claim only 100 ft of [illegible] because only. VI [illegible]

[illegible] 217

28 [illegible]

Code	Location	Comment	Time
AP-SS-04	SW corner of chemical plant outside drain line. On path groove	Line path along and dead headquarters. Moved sample from directly west to [illegible] because of [illegible] vegetation. Dark brown soil, dead trees, also [illegible].	1020
AP-SB-04		Collected 4' b/s at zone of saturation. Clayey sand, gray	1030
AP-TW-04		Collected 4' b/s	1040

M. [illegible]

[illegible]

29

20

1/12/90

I spoke to Mr. [illegible]'s
sister at the airport
office (Manila airport)
They have had pollution
problems from [illegible].
In the past the cattle
feed [illegible] were
contaminated with
fluoride. Also grass
was contaminated and
had to graze cattle
elsewhere. From time
to time, salt content
in soil is a problem
for raising [illegible],
causing bad [illegible]
results. Also [illegible]
results from [illegible] and
and [illegible] to [illegible]

M. [illegible]

[illegible] 1400
[illegible] Manila [illegible]
[illegible]
[illegible] Manila [illegible]
[illegible]
[illegible]
[illegible] [illegible] magnetic,
[illegible]
[illegible] the [illegible]
me 2 [illegible]
[illegible] coverage [illegible]
my [illegible].

[illegible]
315 [illegible]
[illegible]
(213) [illegible]-3410
No coverage [illegible]
[illegible]
[illegible] R – [illegible]
[illegible] of 41 [illegible].
[illegible]
[illegible].
[illegible] Manila [illegible]
[illegible].

M. [illegible]

10/23/16
Detailed sampling information appears on Sample Information Sheet - field work.
TDD: F4-9009-01

The PRP decided not to split samples.

COC Forms:
No. 4 - 1464, 1472, 0210, 1490,
1471, 1488, 1487,
1489, 1486, 15962

Receipt for Sample forms.
Susanne Nupane, WMAY
No. 4 - 0073, - 0150
Reeder Ranch + Dairy,
Don Quinn No. 4 - 0151
Graham Reeder - Airport
Manager No. 4 - 0149

M. [illegible]

[illegible] Sample	Date Oct. '96	Field Measurements Time	pH	Temp °C	Conductivity
SW-01	16	1330	7.0	28.3	6510
SW-02	16	1415	7.2	30.0	1250
SW-04	17	1620	7.0	29.0	2540
SW-05	17	1645	7.1	26.0	13,200
SW-06	17	1440	8.5	30.0	1930
SW-07	17	1515	6.7	30.0	2390
SW-08	17	1605	6.1	28.0	1920
SW-09	17	1515	2.5	30.0	17,740
SW-11	17	1445	8.9	31.0	5720
HC-01	16	1625	6.7	27.0	707
HC-02	17	1040	6.5	28.0	180
HC-03	17	1145	6.7	28.0	3320
HC-04	18	1040	6.7	27.0	2870
HC-05	18	0930	6.4	26.0	3390
HW-01	17	0935	7.3	24.0	1070
MW-01	16	1130	6.7	22.0	980
MW-03	16	0900	6.8	26.0	4050
MW-04	16	1520	7.1	27.0	932
MW-05	16	1350	7.3	28.0	1570
MW-06	16	1615	7.4	27.0	745

33

Air Bill nos: 7414368463

52

SAS (Ri 226/228, Gross) 41

Nat'l. Air + Radiation 15

Case No. 15099 Environ, Mont, Al 26

30

Case Consolidation

SWOK, ~~Britton~~ Arrow, 74

OK

Gulf South Environ Labs

New Orleans

Skinner + Sherman

Waltham, Mass.

41

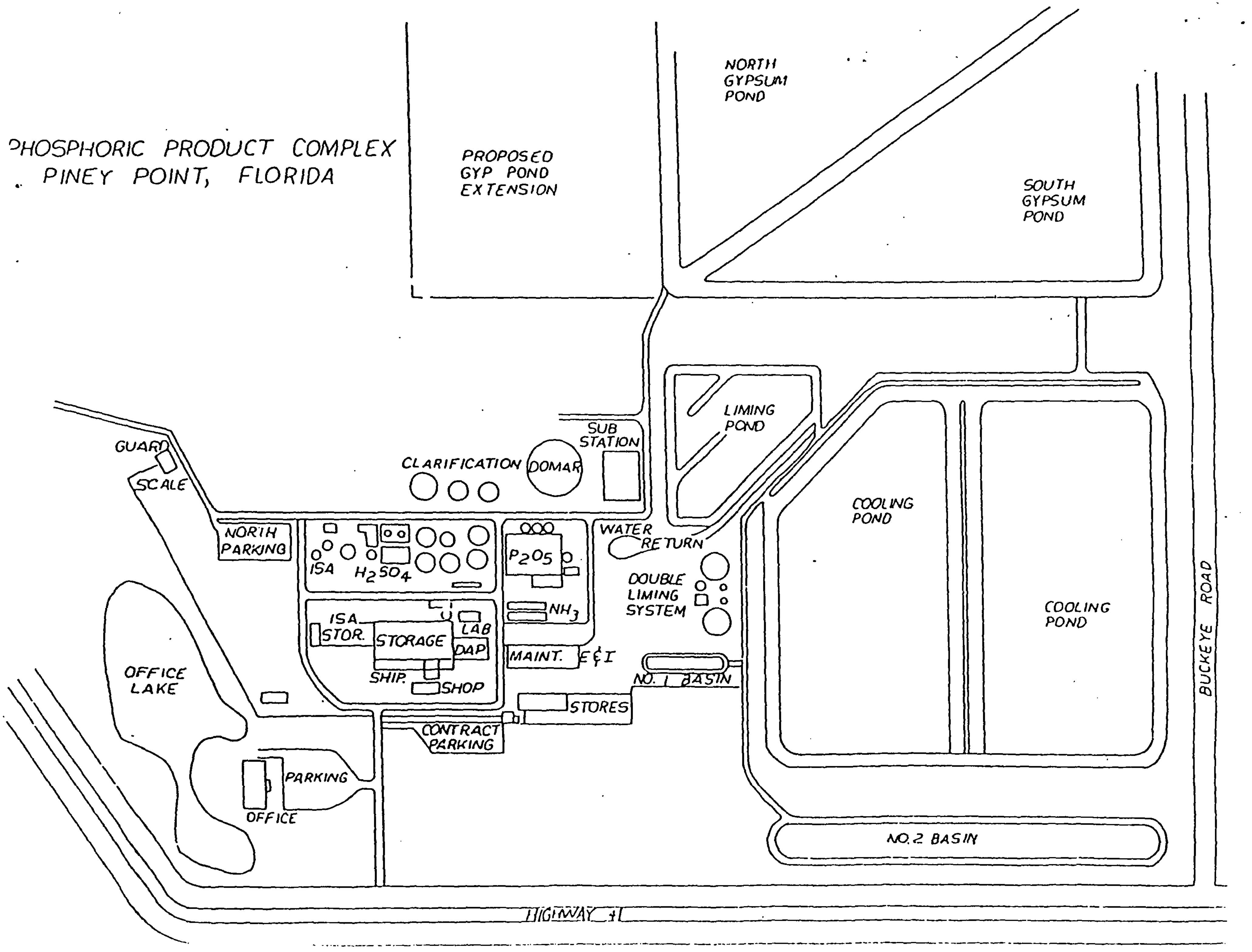
REFERENCE 10

Royster Phosphates, Inc.

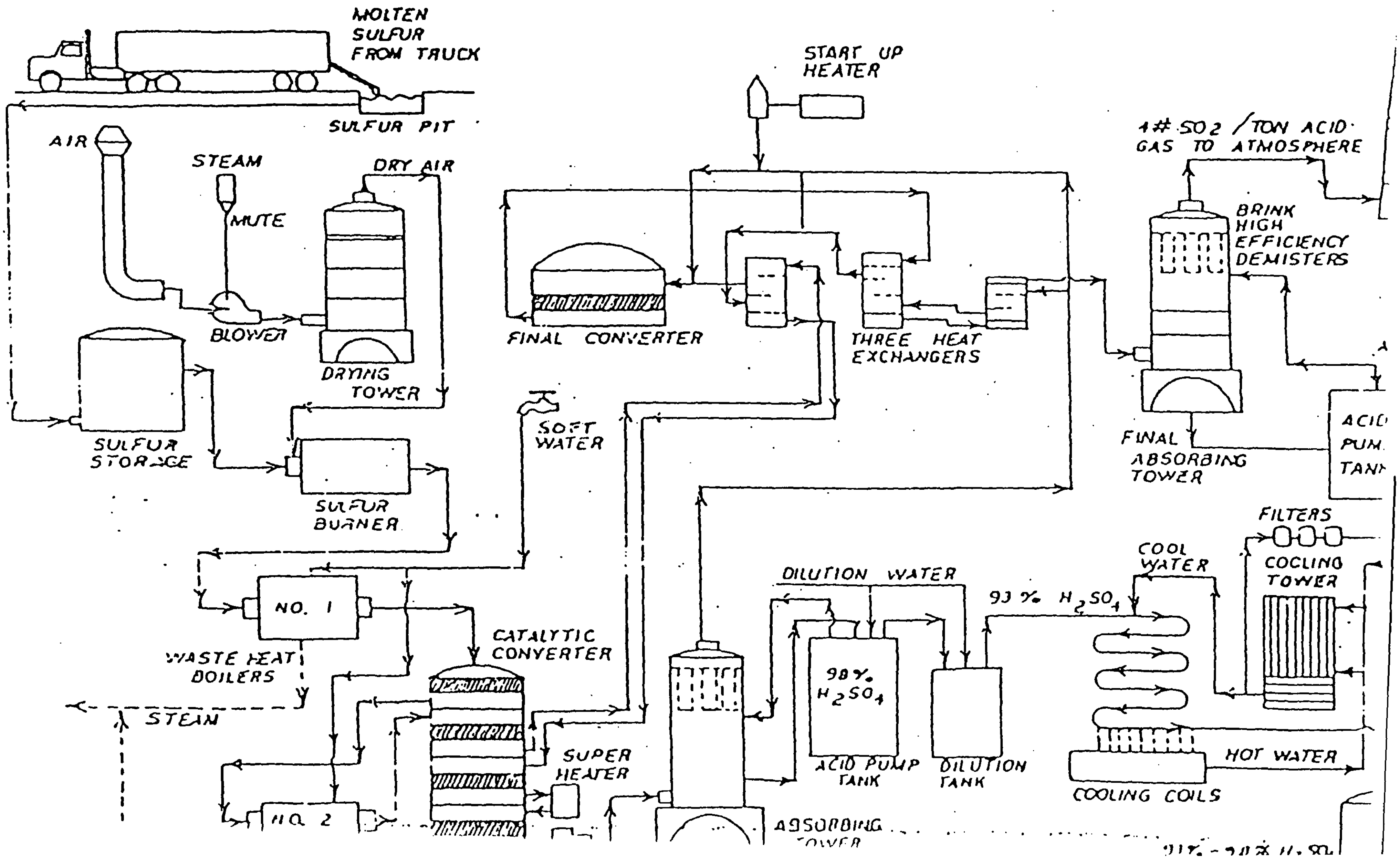
P. O. Box 1329
Palmetto, Florida 34220

PINEY POINT PHOSPHORIC COMPLEX
MANATEE COUNTY, FLORIDA

PHOSPHORIC PRODUCT COMPLEX
PINEY POINT, FLORIDA



Royster Phosphates, Inc. SULFURIC ACID PLANT (H_2SO_4) CONTACT PROCESS



Royster Phosphates, Inc.

P. O. Box 1329
Palmetto, Florida 34220

PHOSPHORIC PRODUCTS COMPLEX
PINEY POINT, FLORIDA

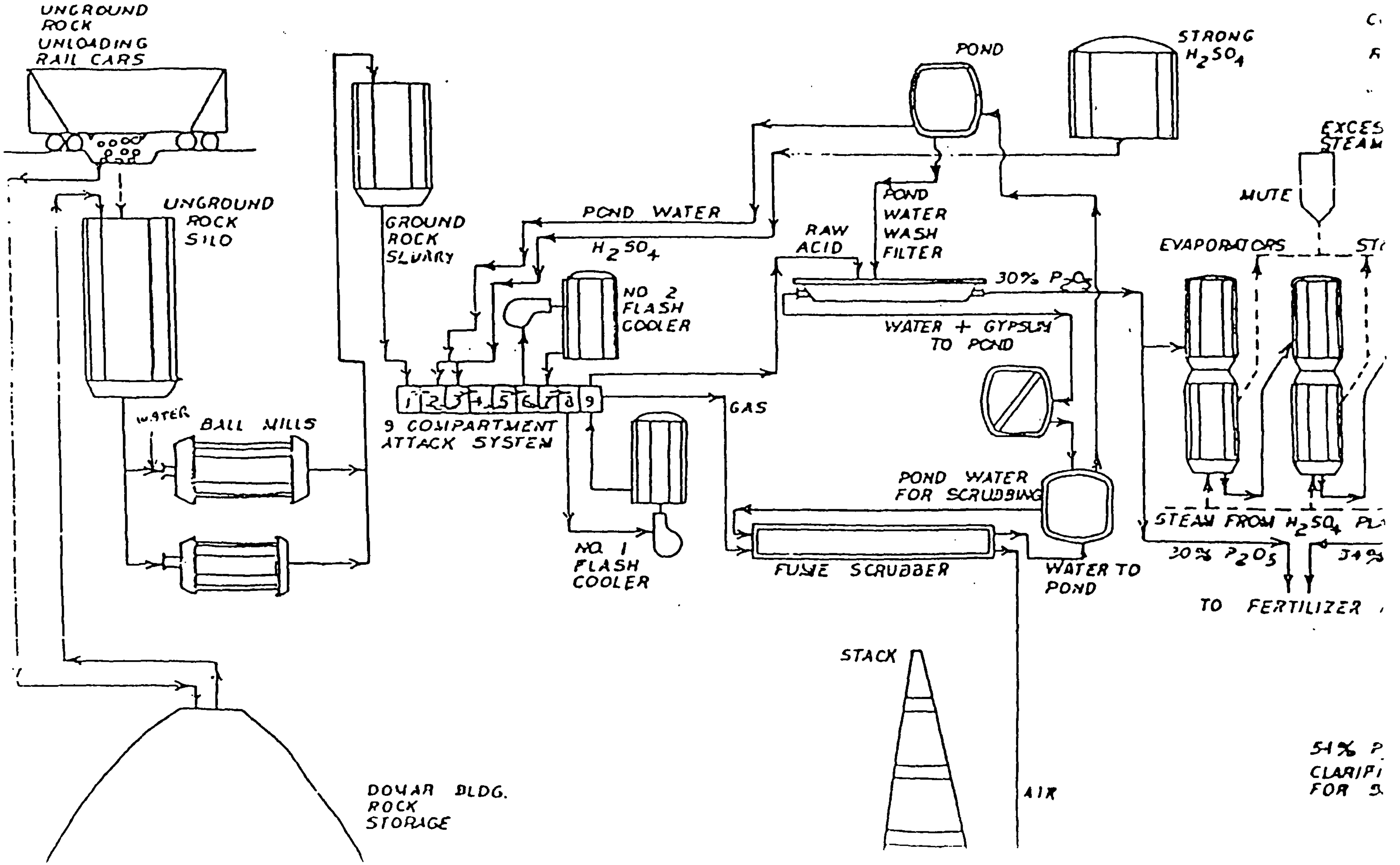
SULFURIC ACID

THE BASIC RAW MATERIALS FOR THE MANUFACTURE OF SULFURIC ACID ARE SULFUR, AIR AND WATER. AT THIS PLANT WE BRING IN MOLTEN SULFUR BY TRUCK WHICH HAS BEEN SHIPPED BY TANKER TO TAMPA FROM LOUISIANA OR TEXAS. THE SULFUR IS BURNED IN A CONTROLLED AMOUNT OF AIR, THEN IT IS CAUSED TO REACT ADDITIONALLY WITH OXYGEN IN THE AIR BY THE USE OF A CATALYST. THE PRODUCT FROM THIS LATTER REACTION IS ABSORBED IN SULFURIC ACID AND WATER TO PROVIDE THE CORRECT STRENGTH OF SULFURIC ACID. ALTHOUGH THE PROCESS IS CHEMICALLY SIMPLE, STRICT CONTROLS ARE NECESSARY IN ORDER TO HAVE AN ECONOMICALLY SOUND PROCESS THAT PREVENTS THE LOSS OF SULFUR COMPOUNDS TO THE ATMOSPHERE. BASICALLY, THE CONTROLS ARE ACID TEMPERATURE AND STRENGTH. TEMPERATURE IS CONTROLLED PRIMARILY BY THE OPERATION OF BOILERS AND COOLING COILS. THE ACID STRENGTH IS CONTROLLED BY ANALYSIS AND VARIOUS CONTROL INSTRUMENTS IN THE PLANT, THAT INDICATE WHEN WATER ADDITION IS NECESSARY.

THIS SULFURIC ACID PLANT WAS, AT ONE TIME, THE LARGEST SINGLE UNIT PLANT IN THE WORLD AND IS STILL ONE OF THE LARGEST. THE SIZE IS ILLUSTRATED BY THE LARGE SIZES OF PARTICULAR PIECES OF EQUIPMENT IN THE PLANT. THE STEAM TURBINE DRIVEN AIR BLOWER OF 3560 HORSEPOWER AND THE MASSIVE 4-PASS CONVERTER ARE PRIME EXAMPLES.

THE THREE CYLINDRICAL TOWERS OVER THE CONTROL ROOMS ARE, THE DRYING TOWER AND NO. 1 AND 2 ABSORBING TOWERS. THE AIR ENTERING THE PLANT IS CLEANED AND DRIED IN THE DRYING TOWER. THE TWO TALLER TOWERS ARE THE ABSORBING TOWERS, MECHANICALLY IDENTICAL TO THE DRYING TOWER. THEIR GREATER HEIGHT IS USED TO ACCOMMODATE HIGH EFFICIENCY BRINK MIST ELIMINATORS WHICH SAFEGUARD THE ENVIRONMENT BY EFFECTIVELY ELIMINATING THE POSSIBILITY OF ESCAPING ACID MIST OR OXIDES OF SULFUR.

Royster PHOSPHORIC ACID PLANT (P_2O_5) WET PROCESS



PHOSPHORIC ACID

THE BASIC RAW MATERIALS FOR THE PRODUCTION OF PHOSPHORIC ACID ARE PHOSPHATE ROCK, SULFURIC ACID AND WATER. WE OBTAIN PHOSPHATE ROCK FROM FLORIDA MINES AND THE SULFURIC ACID FROM OUR OWN PLANT.

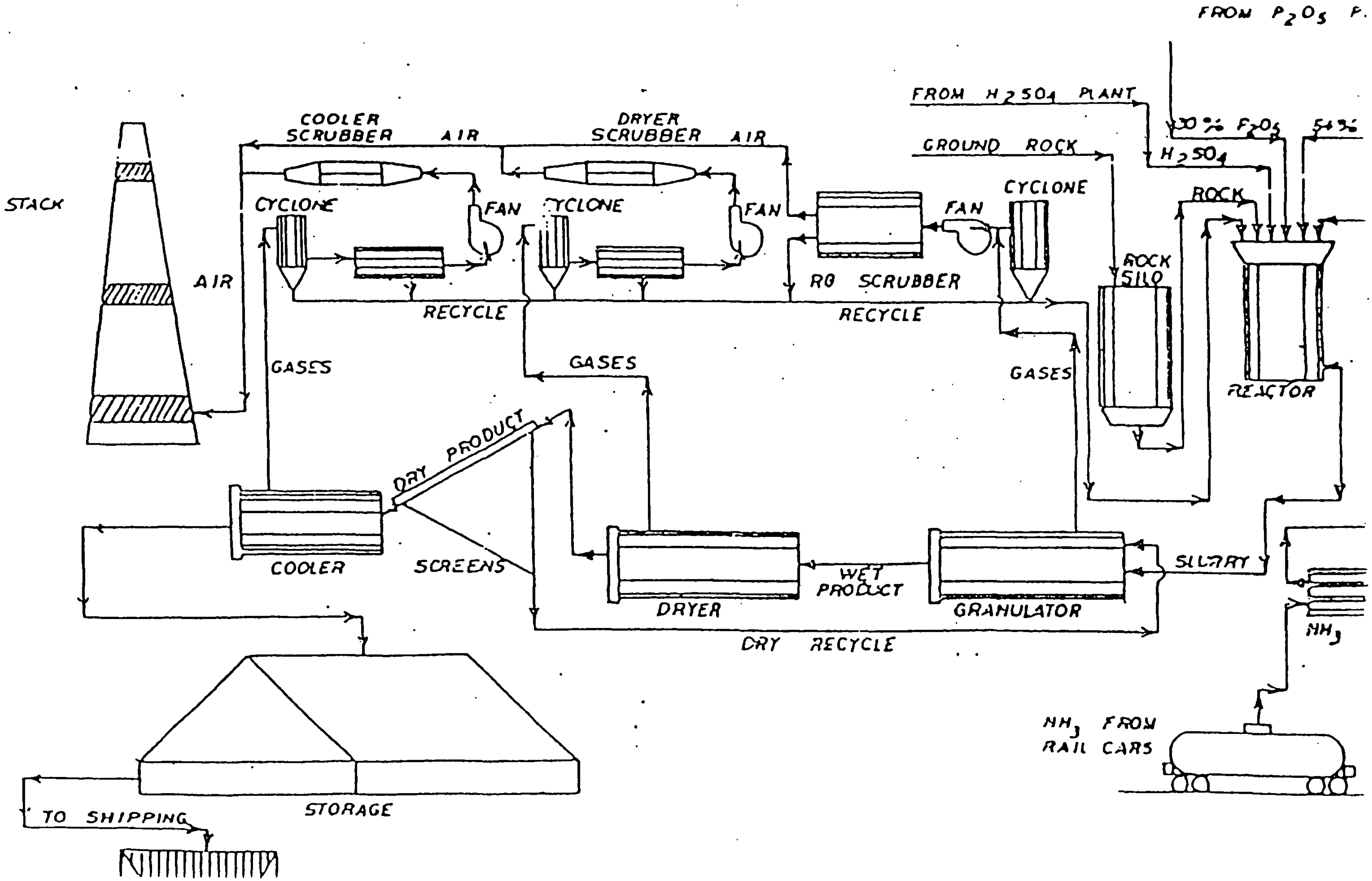
THE WET PHOSPHATE ROCK IS FED WITH ADDITIONAL WATER TO ONE OF TWO BALL MILLS AND GROUND INTO A SLURRY RESEMBLING SOFT ICE CREAM. THE ROCK SLURRY IS THEN PUMPED FROM THE MILL DISCHARGE TANK TO THE COMPARTMENTED PHOSPHORIC ACID REACTION TANK.

THE LIQUID SLURRY RESULTING FROM THE REACTION OF PHOSPHATE ROCK AND SULFURIC ACID IS FILTERED ON AN ELABORATE, CONTINUOUS FILTER AND PHOSPHORIC ACID IS REMOVED FROM THE FILTER AS PRODUCT. THE SOLIDS REMOVED BY THE FILTER ARE ESSENTIALLY GYPSUM (CALCIUM SULFATE DIHYDRATE) AND THIS MATERIAL IS TRANSPORTED AS A WATER SLURRY FROM THE FILTER TO A GYPSUM SETTLING POND. THE ACID PRODUCT FROM THE FILTER CONTAINS APPROXIMATELY 30% P_2O_5. (PHOSPHORIC ACID STRENGTH IN THE FERTILIZER INDUSTRY IS UNIVERSALLY ANALYZED AND REPORTED AS PERCENT P_2O_5. FROM A STRICT CHEMICAL POINT OF VIEW, THE 30% P_2O_5 PRODUCT IS ACTUALLY ABOUT 41% STRENGTH AS ORTHO PHOSPHORIC ACID, H_3PO_4.)

THE 30% ACID IS CONCENTRATED TO ABOUT 54% P_2O_5 IN THREE (3) VACUUM EVAPORATORS TO MAKE A PRODUCT MORE SUITABLE FOR SHIPMENT. THE 54% ACID IS ALLOWED TO AGE AND SETTLE BEFORE SHIPMENT. THE AGING AND SETTLING WHICH REDUCE IMPURITIES IN THE ACID, IS CARRIED OUT IN THE LARGE TANKS JUST NORTH OF THE PHOSPHORIC ACID PLANT.

EXHAUST AIR FROM THE PHOSPHORIC ACID PROCESS IS WASHED WITH RECYCLED WATER TO SCRUB OUT HARMFUL GASES BEFORE DISCHARGE FROM THE STACK.

Royster DRY PRODUCTS — DIAMMONIUM PHOSPHATE OR TRIPLE SUPER PHOSPHATE



FERTILIZER PLANT

WE MANUFACTURE DIAMMONIUM PHOSPHATE (DAP 18-46-0) IN OUR FERTILIZER PLANT. WE ALSO HAVE THE ABILITY TO PRODUCE GRANULAR TRIPLE SUPER PHOSPHATE (GTSP 0-46-0). BASICALLY THE SAME EQUIPMENT IS USED IN PRODUCING EITHER PRODUCT. ONLY THE RAW MATERIALS USED, OR THEIR PROPORTIONS, ARE CHANGED.

TO PRODUCE 18-46-0, PHOSPHORIC ACID, FROM OUR PLANT, AND ANHYDROUS AMMONIA, WHICH IS BROUGHT IN BY RAILROAD, ARE THE BASIC INGREDIENTS. IF WE WERE PRODUCING 0-46-0 WE USE PHOSPHORIC ACID FROM OUR PLANT AND BRING IN GROUND 75 BPL (75% BONE PHOSPHATE OF LIME) PHOSPHATE ROCK FROM FLORIDA MINES.

IN BOTH PROCESSES THE RAW MATERIALS ARE ADDED TOGETHER IN A TANK WHERE THE CHEMICAL REACTIONS ARE COMPLETED AND THE RESULTING LIQUID SLURRY IS PUMPED TO THE SOLIDS MATERIALS HANDLING SYSTEM. IN THE SOLIDS SYSTEM THE REACTION PRODUCTS ARE DISTRIBUTED UPON A BED OF RETURNING SOLID MATERIAL. BY CONTROLLING THE PROPORTIONS OF REACTION PRODUCTS AND SOLID MATERIALS WE OBTAIN CONTROL OVER THE SIZE AND APPEARANCE OF THE FINISHED PRODUCT. AFTER THE PRODUCT HAS BEEN FORMED INTO THE DESIRED SIZE OF GRANULES IT IS DRIED, SCREENED AND CONVEYED TO THE PRODUCT STORAGE.

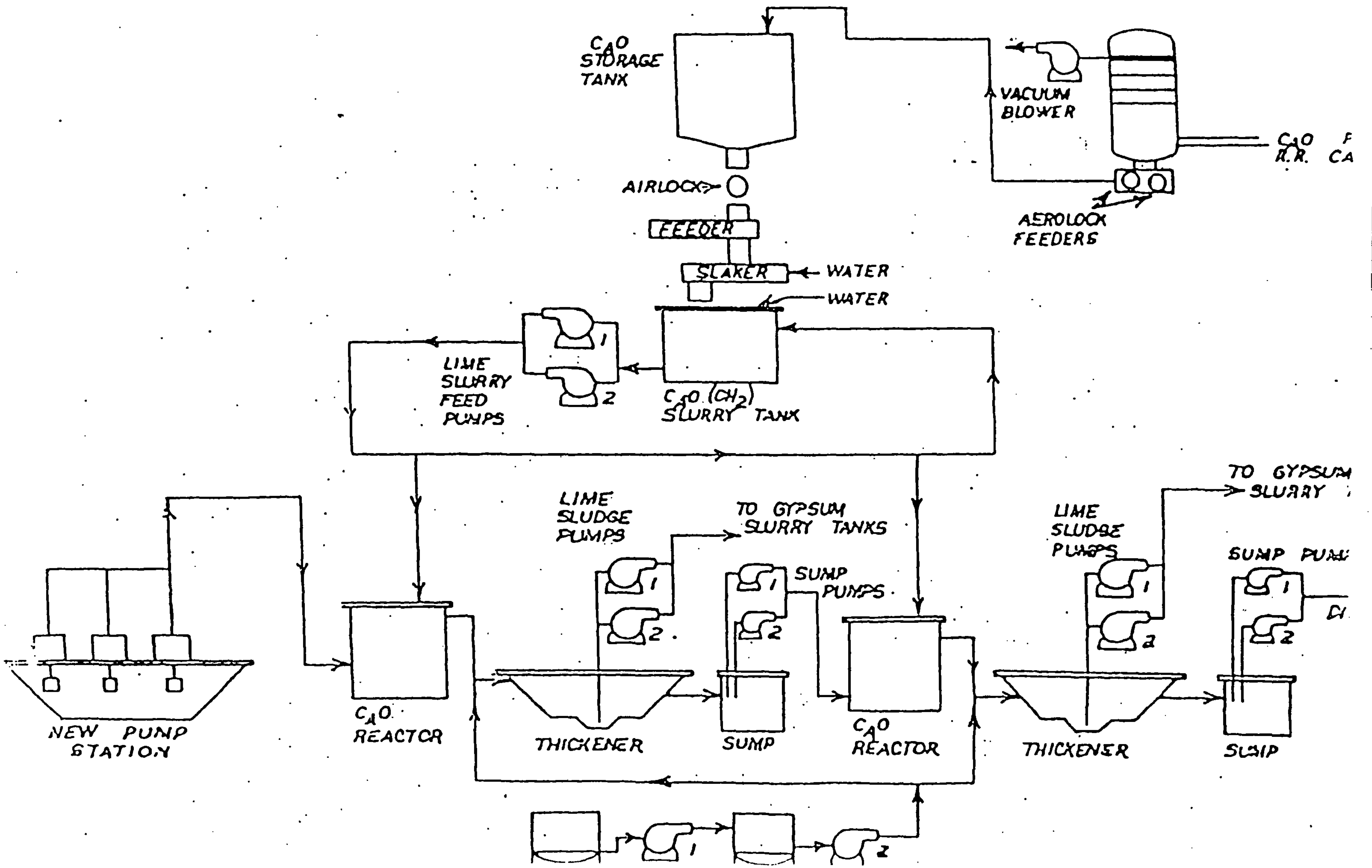
THIS PARTICULAR PLANT IS RATHER ADVANCED IN THAT THE MATERIALS HANDLING EQUIPMENT IS OF SUCH SIZE AND DESIGN THAT CONTROL OF THE PROCESSES IS CONVENIENTLY ACCOMPLISHED. IN PARTICULAR, THE DRYER IS 11' IN DIAMETER AND 90' LONG, WHICH

MAKES IT ONE OF THE LARGEST IN THE INDUSTRY. ALSO, OUR SCREENING CAPACITY FOR SIZE CONTROL IS VERY LARGE WITH RESPECT TO THE NORMAL AMOUNT OF MATERIAL PUT OVER IT. THE ABILITY TO ACCOMPLISH SUPERIOR DRYING AND SCREENING ALLOWS US TO MAKE A PRODUCT OF EXCELLENT HANDLING AND SHIPPING QUALITY.

MATERIAL RECOVERY PLAYS A SIGNIFICANT PART IN THE EFFICIENCY OF ANY FERTILIZER PLANT. BY INSTALLING A VERY ADVANCED SCRUBBER SYSTEM WE ARE ABLE TO KEEP OUR MATERIAL LOSS AT A MINIMUM. WE HAVE TOTAL OF SIX SEPARATE SCRUBBERS TO INSURE AGAINST THE LOSS OF THE DRY PRODUCT AS DUST, AND GASEOUS EMISSIONS WHICH MIGHT CAUSE POLLUTION. THE RATHER ELABORATE MASS OF DUCTING AND EQUIPMENT ON THE WESTERN SIDE OF THE PLANT MAKE UP THE MAJOR PART OF THE SCRUBBING SYSTEM. THE SIZES AND SHAPES OF THE DUCT WORK ARE ENGINEERED FOR MAXIMUM PERFORMANCE AND THIS SOMEWHAT COMPROMISES THEIR APPEARANCE.

THE PRODUCTS FROM OUR FERTILIZER PLANT MAY, AT TIMES, BE USED AS FINISHED PRODUCTS, BUT THEIR MAIN USE IS AS INTERMEDIATE PRODUCTS FOR USE IN THE PRODUCTION OF OTHER GRADES OF FERTILIZER. MOST OF THE MATERIAL IS EXPORTED, BUT IT COULD BE SHIPPED TO FERTILIZER PLANTS IN THE UNITED STATES.

Royster WATER TREATMENT —— DOUBLE LIMING SYSTEM



WATER TREATMENT

IN THE PRODUCTION OF PHOSPHORIC ACID AND PHOSPHATE FERTILIZER, GASSES AND PARTICULATES (DUST OR LIQUID DROPLETS) ARE EMITTED TO THE ATMOSHPERE. THESE EMITANTS ARE CAPTURED IN WATER STREAMS WITHIN SO-CALLED SCRUBBERS. THIS WATER IS RECIRCULATED AND REUSED IN THE VARIOUS PRODUCTION PROCESSES.

PART OF THE PRODUCTION CYCLE IS THE REMOVAL OF GYPSUM FROM PHOSPHORIC ACID BY FILTRATION. THE GYPSUM COMES OFF THE FILTER AS A SOLID AND IN OUR SYSTEM IS SLURRIED WITH WATER TO BE REMOVED FROM THE PLANT TO A GYPSUM STACKING AREA. HERE THE WATER IS ALLOWED TO SEPARATE FROM THE GYPSUM AND FORMS THE RECIRCULATION WATER FOR REUSE IN THE PRODUCTION OF PHOSPHATE PRODUCTS. ONCE WATER HAS COME INTO CONTACT WITH EITHER THE GASEOUS EMISSIONS, DUST, OR GYPSUM IT IS THEN CONTAMINATED AND CANNOT BE RELEASED FROM THE PLANT SITE. THEREFORE IT IS NECESSARY TO HAVE LARGE HOLDING PONDS THAT CAN CONTAIN SEVERAL MILLION GALLONS OF WATER.

DURING MOST YEARS ALL WATER REQUIREMENTS FOR THE PHOSPHORIC ACID COMPLEX CAN BE SATISFIED BY THE RAINFALL/EVAPORATION BALANCE ON THE POND SYSTEM. HOWEVER, DURING SOME RAINY PERIODS THE WATER LEVELS IN THE PONDS MAY EXCEED THE VOLUMES ESTABLISHED FOR WATER CONTAINMENT. THIS CRITICAL LEVEL IS DETERMINED BY THE AMOUNT OF STORAGE NEEDED TO CONTAIN HIGH RAINFALL EVENTS (UP TO 10 INCHES IN 24 HOURS).

IN ORDER TO MAINTAIN THE WATER LEVEL BELOW THIS POINT, WATER TREATMENT FACILITIES MUST BE AVAILABLE. TREATMENT MUST TAKE WATER THAT HAS A pH OF BELOW = 3.0 AND CONTAINS LARGE AMOUNTS OF FLUORIDE AND PHOSPHORUS, AND NEUTRALIZE IT TO A pH OF 6.0 - 9.0, AND REDUCE THE FLUORIDE AND PHOSPHORUS LEVELS TO JUST A FEW PARTS PER MILLION. THE EQUIPMENT NECESSARY TO DO THIS IS CALLED A "DOUBLE LIMING" FACILITY AND INVOLVES A TWO STAGE TREATMENT OF THE WATER. THE LIME COMES INTO THE PLANT AS PEBBLE, IT IS THEN PRE-REACTED WITH WATER (THIS IS CALLED SLAKING) AND SLURRIED WITH MORE WATER TO MAKE IT SUITABLE FOR WATER NEUTRALIZATION.

IN THE FIRST STAGE, LIME SLURRY AND CONTAMINATED WATER ARE MIXED TO REMOVE THE FLUORIDE. THE SOLID MATERIAL FORMED SETTLES FROM THE MIXTURE. THE WATER FROM THIS STAGE THEN IS REACTED WITH MORE LIME SLURRY, IN A DIFFERENT VESSEL, FORMING MORE SOLIDS TO REMOVE THE PHOSPHORUS. IN EACH STAGE SOLIDS ARE FORMED AND MUST BE MECHANICALLY REMOVED TO PREVENT THEM FROM RECONTAMINATING THE WATER. THE SOLIDS ARE DISPOSED WITH THE GYPSUM INTO THE STACKING AREA. THE TREATED WATER IS THEN SENT TO A HOLDING POND FOR FINAL CLARIFICATION BY SETTLING. IT IS PURE ENOUGH TO BE RELEASED TO THE RECEIVING BODY OF WATER, IN OUR CASE, A SALT WATER ESTUARY. EACH STAGE OF THE LIMING PROCESS IS MONITORED FOR pH WITH THE FINAL WATER BEING MONITORED THREE TIMES FOR pH AND CONTAMINATES BEFORE IT IS RELEASED.

REFERENCE 11

PB90-258492

REPORT TO CONGRESS ON SPECIAL WASTES FROM MINERAL PROCESSING - SUMMARY AND FINDINGS METHODS AND ANALYSES APPENDICES

(U.S.) Environmental Protection Agency
Washington, DC

Jul 90

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
NTIS

PB90-258492

United States
Environmental Protection
Agency

Solid Waste and
Emergency Response
(OS-305)

EPA/530-SW-90-070C
July 1990

EPA

Report to Congress on Special Wastes from Mineral Processing

Summary and Findings
Methods and Analyses
Appendices

Chapter 12
Phosphoric Acid Production

The phosphoric acid production industry consists of 21 facilities that were active as of September 1989,[1] employed the wet phosphoric acid production process, and generated two special wastes from mineral processing: process wastewater and phosphogypsum. The data included in this chapter are discussed in additional detail in a technical background document in the supporting public docket for this report.

12.1 Industry Overview

There are two processes for producing phosphoric acid: (1) the wet process, which is a mineral processing operation and is studied here, and (2) the furnace process. Furnace process phosphoric acid production uses elemental phosphorus rather than beneficiated phosphate rock as a feedstock and, therefore, wastes generated by the process are not mineral processing special wastes according to the Agency's definition of mineral processing. Consequently, furnace process production of phosphoric acid is not within the scope of this report.

About 95 percent of the commercial phosphoric acid produced by the wet process is used in the production of fertilizers and animal feed, with a small portion used as a feedstock in chemical processing operations.[2] Typically, the fertilizer and feed plants are co-located with the phosphoric acid facilities.

As shown in Exhibit 12-1, the majority of the 21 active wet process facilities are located in the southeast, with 12 in Florida, three in Louisiana, and one in North Carolina. Production data and dates of initial operation and modernization were provided by all 21 facilities, although two claimed confidential status for their information. The dates of initial operation for the 19 non-confidential facilities ranges from 1945 to 1986.[3] Most of these facilities have undergone modernization within the last ten years, although six facilities have not been upgraded in over 20 years. The 19 reporting non-confidential facilities have a combined annual production capacity of over 11 million metric tons and a 1988 aggregate production of nearly 8.5 million metric tons; the 1988 capacity utilization rate, therefore, was approximately 77 percent. Several facilities, however, operated at low utilization rates (i.e. three facilities reported rates of 15.8, 30.1 and 37.5 percent).

The fertilizer industry, the largest user of phosphoric acid, suffered poor financial conditions for much of the 1980s. These conditions were the result of low domestic demand and reduced foreign buying. Domestic demand for phosphoric acid was boosted by the 1988 recovery of the farm economy and was expected to continue to grow as crop prices and planted acreage increased in 1989. Non-fertilizer uses of phosphoric acid declined during the 1980s due to strict regulations governing the use of phosphates in household products and a decline in industrial demand.[4]

The wet process consists of three operations: digestion, filtration, and concentration, as shown in Exhibit 12-2.[5] Beneficiated phosphate rock is dissolved in phosphoric acid; sulfuric acid is added to this solution and chemically digests the calcium phosphate. The product of this operation is a slurry that consists

[1] At least two facilities were on standby in 1988, Agrico's Ft. Madison, Iowa and Hahnville (Taft), Louisiana facilities; they are not included in this analysis.

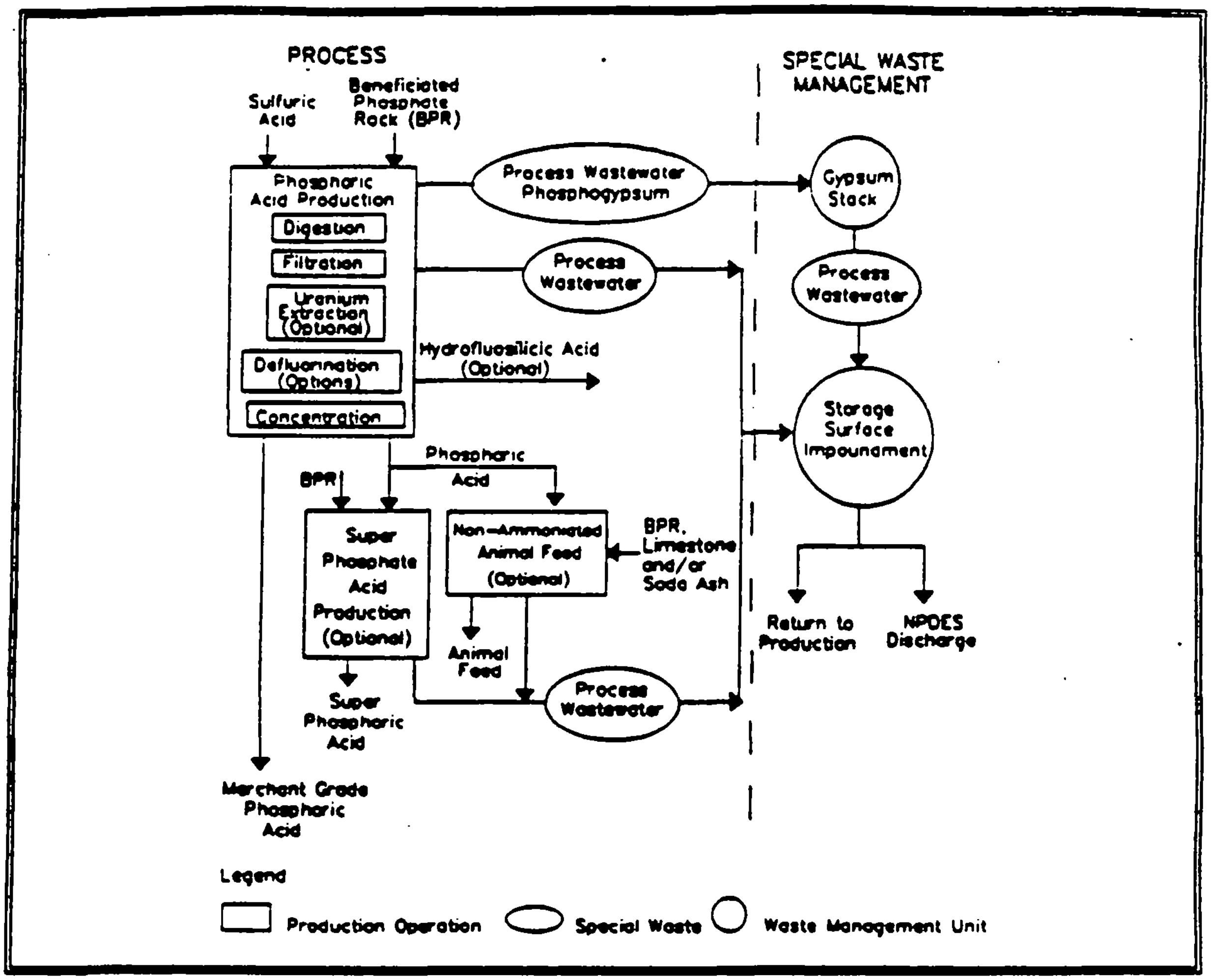
[2] Bureau of Mines, 1987. Minerals Yearbook, 1987 Ed., p. 676.

[3] Phosphoric acid producers, 1989. Company Responses to the "National Survey of Solid Wastes from Mineral Processing Facilities," U.S.EPA, 1989.

[4] Standard & Poor's, "Chemicals: Basic Analysis," Industry Surveys, October 13, 1988 (Section 3), p. C20.

[5] Environmental Protection Agency, 1986. Evaluation of Waste Management for Phosphate Processing. Prepared by PEI Associates for U.S. EPA, Office of Research and Development, Cincinnati, OH, August, 1986.

Exhibit 12-2
Phosphoric Acid Production



12.2 Waste Characteristics, Generation, and Current Management Practices

12.2.1 Phosphogypsum

Phosphogypsum, which has an average particle diameter of less than 0.02 millimeters, is primarily composed of calcium sulfate, silicon, phosphate, and fluoride. It also typically contains a variety of radionuclides, including uranium-230, uranium-234, thorium-230, radium-226, radon-222, lead-210 and polonium-210.

Using available data on the composition of phosphogypsum, EPA evaluated whether leachate from this material exhibits any of the four characteristics of hazardous waste: corrosivity, reactivity, ignitability, and extraction procedure (EP) toxicity. Based on available information and professional judgment, the Agency does not believe phosphogypsum is reactive, corrosive, or ignitable. Some phosphogypsum samples, however, exhibit the characteristic of EP toxicity. EP leach test concentrations of all eight inorganic constituents with EP toxicity regulatory levels are available for 28 phosphogypsum samples from 11 facilities of interest. Of these constituents, only chromium concentrations exceed the EP toxicity levels; this occurred in 2 of 28 samples analyzed, by as much as a factor of 9. Both samples that failed the EP toxicity criterion for chromium of 2.7) in only 3 samples (2 of which were from the Pocatello facility and 1 from the Pascagoula facility). SPLP leach test results for phosphoric acid process wastewater samples were well below the EP toxicity regulatory levels for all constituents.

Non-confidential waste generation rate data were fully reported for process water by 12 of the 21 processing facilities and estimated for the remaining nine. The aggregate annual industry-wide generation of process water was approximately 1.77 billion metric tons (468 billion gallons) in 1988, yielding a facility average of 84 million metric tons per year (60 million gallons per day [mgd]). Reported facility annual generation rates ranged from 13 to 280 million metric tons of process wastewater (9.3 to 200 mgd). The ratio of process water managed to phosphoric acid produced ranges from 102 to 494.

The process wastewater from the stacks, along with non-transport process waters, are typically managed in on-site impoundments, commonly known as cooling ponds. These impoundments are used in conjunction with the gypsum stacks in an integrated system. Water from these ponds is reused in on-site mineral processing and other activities. The facility operators ideally seek to maintain a water balance such that no treatment and discharge of process wastewater to surface water is necessary, although some facilities are equipped to treat and discharge some wastewater during periods of high precipitation.

The average dimensions of the cooling ponds are nearly 60 hectares (145 acres) of surface area and 2.6 meters (8.5 feet) of depth; on a facility-specific basis the surface area ranges from 1 to 260 hectares (2.5 to 640 acres) and depth ranges from 0.3 to 6.7 meters (1 to 21 feet).

12.3 Potential and Documented Danger to Human Health and The Environment

This section addresses two of the study factors required by §8002(p) of RCRA: (1) potential danger (i.e., risk) to human health and the environment; and (2) documented cases in which danger to human health or the environment has been proven. The Agency's evaluation of the potential dangers posed by phosphogypsum and phosphoric acid process wastewater uses the evidence presented in numerous documented cases of danger to human health and the environment to establish that these wastes can threaten human health and the environment as they are currently managed. Overall conclusions about the hazards associated with phosphogypsum and phosphoric acid process wastewater are provided after these two study factors are discussed.

12.3.1 Risks Associated With Phosphogypsum and Phosphoric Acid Process Wastewater

Any potential danger to human health and the environment from phosphogypsum and phosphoric acid process wastewater depends on the presence of toxic and radioactive constituents in the wastes that may present a hazard and the potential for exposure to these constituents. The Agency has documented cases of dangers posed by these wastes via ground and surface water pathways (see Section 12.3.2), and has previously evaluated potential air pathway dangers from the management of phosphogypsum in stacks. Based on the insights provided by analyses of the hazards posed by phosphogypsum and phosphoric acid wastewater, and information on waste characteristics and management developed for this study, the Agency evaluated the intrinsic hazard of these wastes and the potential for toxic and radioactive constituents from these wastes to pose threats to human health and the environment. This evaluation discusses constituents of potential concern in the wastes and assesses the management practice and environmental setting characteristics that affect the potential for these wastes to pose risks through the ground-water, surface water, and air pathways.

Phosphogypsum Constituents of Potential Concern

EPA identified chemical constituents in phosphogypsum that may present a hazard by collecting data on the composition of this waste and evaluating the intrinsic hazard of the chemical constituents.

Exhibit 12-3
Potential Constituents of Concern in Phosphogypsum Solids[a]

Potential Constituents of Concern	No. of Times Constituent Detected/No. of Analyses for Constituent	Human Health Screening Criteria[b]	No. of Analyses Exceeding Criteria/ No. of Analyses for Constituent	No. of Facilities Exceeding Criteria/ No. of Facilities Analyzed for Constituent
Radium-226	29 / 29	Radiation*[c]	28 / 29	6 / 7
Uranium-238	18 / 18	Radiation*[c]	1 / 18	1 / 3
Chromium	34 / 43	Inhalation*	8 / 43	4 / 8
Arsenic	35 / 43	Ingestion* Inhalation*	34 / 43 29 / 43	2 / 8 1 / 8

(a) Constituents listed in this table are present in at least one sample from at least one facility at a concentration that exceeds a relevant screening criterion. The conservative screening criteria used in this analysis are listed in Exhibit 2-3. Constituents that were not detected in a given sample were assumed not to be present in the sample.

(b) Human health screening criteria are based on exposure via incidental ingestion and inhalation. Human health effects include cancer risk and noncancer health effects. Screening criteria noted with an "*" are based on a $1x10^{-5}$ lifetime cancer risk; others are based on noncancer effects.

(c) Includes direct radiation from contaminated land and inhalation of radon decay products.

facilities analyzed. None of these constituents, however, exceed the screening criteria by more than a factor of 10.

- Radium-226, and uranium-238 concentrations exceed health-based screening criteria based on multiple radiation pathways. Exceedance of these criteria indicates that phosphogypsum could pose an unacceptable radiation risk if used in an unrestricted manner (for instance, direct radiation doses and doses from the inhalation of radon could be unacceptably high if phosphogypsum is used around homes).
- Chromium and arsenic concentrations exceed the health-based screening criteria for inhalation. This indicates that these constituents could pose a significant cancer risk (i.e., greater than $1x10^{-5}$) if phosphogypsum were released to the ambient air as particles.
- Arsenic concentrations exceed the health-based screening criteria for incidental ingestion. This indicates that arsenic may pose a significant incremental lifetime health risk (i.e., greater than $1x10^{-5}$) if a small quantity of phosphogypsum or soil contaminated with phosphogypsum is inadvertently ingested on a routine basis (e.g., airborne waste particles may be deposited on crops, or small children playing on abandoned stacks could inadvertently ingest the waste).

EPA sampling and analysis also indicates that levels of gross alpha and beta radiation from phosphogypsum are very high (10 to 100 pCi/g) relative to levels associated with typical soils (approximately 1 pCi/g).

Based on a comparison of leach test concentrations of 29 constituents to surface and ground-water pathways screening criteria (see Exhibit 12-4), 17 constituents were found to be of potential concern for water-based release and exposure. Among these 17 constituents, phosphorus, arsenic, lead, phosphate, manganese, molybdenum, and nickel exceed screening criteria in at least one-half of all facilities analyzed. Twelve constituents exceed the screening criteria by more than a factor of 10, but only chromium was measured in concentrations that exceed the EP toxicity regulatory level. All of these constituents are very persistent in the environment.

These exceedances of the screening criteria have the following implications:

- Concentrations of arsenic, lead, cadmium, chromium, fluoride, zinc, antimony, copper, and thallium in phosphogypsum leachate exceed screening criteria based on human health risks. This indicates that, if phosphogypsum leachate were diluted less than 10-fold during migration to a drinking water exposure point, long-term chronic ingestion could cause adverse health effects due to the presence of these constituents. The concentration of arsenic in diluted phosphogypsum leachate could pose a cancer risk of greater than $1x10^{-5}$ from long-term drinking water exposures.
- Concentrations of phosphorus, lead, phosphate, nickel, iron, cadmium, chromium, silver, zinc, copper, and mercury in phosphogypsum leachate exceed screening criteria for protection of aquatic life. This means that phosphogypsum leachate could present a threat to aquatic organisms if it migrates (with less than 100-fold dilution) to surface waters.
- Lead, manganese, molybdenum, nickel, iron, cadmium, chromium, zinc, and copper concentrations in phosphogypsum leachate exceed ground and surface water resource damage screening criteria. This indicates that, if released and diluted by a factor of 10 or less, leachate from this waste may contain these constituents in concentrations sufficient to severely restrict the potential future uses of nearby ground and surface water resources.

These exceedances of the screening criteria, by themselves, do not demonstrate that phosphogypsum poses a significant risk, but rather indicate that it may present a hazard. To determine the potential for phosphogypsum to cause significant impacts, EPA proceeded to analyze the actual conditions that exist at the facilities that generate and manage the waste (see the following section on release, transport, and exposure potential).

Process Wastewater Constituents of Potential Concern

Using the same process summarized above for phosphogypsum, EPA identified chemical constituents in phosphoric acid process wastewater that could conceivably pose a risk by collecting data on the composition of this waste, and evaluating the intrinsic hazard of the chemical constituents present in the process wastewater.

Data on Process Wastewater Composition

EPA's characterization of process wastewater and its leachate is based on data from: (1) a 1989 sampling and analysis effort by EPA's Office of Solid Waste (OSW), and (2) industry responses to a RCRA §3007 request. These data provide information on the concentrations of 21 metals, radium-226, uranium-238, gross alpha and gross beta radiation, a number of other inorganic species (i.e., chloride, fluoride, phosphate, nitrate, sulfate, and ammonia), and seven organic compounds in total and leach test analyses. Data on the pH of process wastewater was also collected: at most facilities, the pH is between 1 and 2 standard units, however, two facilities report minimum levels below 1, and 1 facility reports levels between 6.5 and 8 standard units. The waste composition data represent samples collected from 17 of the 21 active phosphoric acid production facilities. As with the concentration data for phosphogypsum, data on the concentrations of most constituents in process wastewater vary over two or three orders of magnitude. Concentrations from leach test analyses of the wastewater vary to a smaller extent.

Concentrations of most (i.e., 22 of 40) constituents in total analyses of process wastewater vary considerably among the samples analyzed (i.e., the range of values spans more than three orders of magnitude). Concentration data provided by industry represent a larger number of samples and span a wider range of values than do data from EPA's sampling and analysis efforts. Concentrations of most constituents in leach test analyses of process wastewater vary considerably less than do concentrations in total analyses (i.e., the ranges of values span two or three orders of magnitude for only five constituents). Because the waste

Exhibit 12-5
Potential Constituents of Concern in Phosphoric Acid Process Wastewater (Total)[a]

Potential Constituents of Concern	No. of Times Constituent Detected/No. of Analyses for Constituent	Screening Criteria[b]	No. of Analyses Exceeding Criteria/ No. of Analyses for Constituent	No. of Facilities Exceeding Criteria/ No. of Facilities Analyzed for Constituent
Arsenic	77 / 78	Human Health* Resource Damage Aquatic Ecological	76 / 78 37 / 78 21 / 78	15 / 15 8 / 15 5 / 15
Phosphorus	31 / 31	Aquatic Ecological	31 / 31	10 / 10
Phosphate	38 / 38	Aquatic Ecological	38 / 38	9 / 9
Cadmium	73 / 77	Human Health Resource Damage Aquatic Ecological	65 / 77 69 / 77 68 / 77	14 / 15 14 / 15 14 / 15
Chromium	75 / 78	Human Health Resource Damage Aquatic Ecological	26 / 78 65 / 78 44 / 78	8 / 15 14 / 15 9 / 15
Aluminum	58 / 59	Resource Damage Aquatic Ecological	42 / 59 53 / 59	8 / 10 10 / 10
Gross Alpha	46 / 47	Resource Damage	40 / 47	11 / 11
Gross Beta	34 / 47	Resource Damage	30 / 47	9 / 9
Radium-226	86 / 89	Human Health* Resource Damage	26 / 89 14 / 89	9 / 13 5 / 13
Phenol	4 / 5	Resource Damage	4 / 5	3 / 3
Iron	54 / 55	Resource Damage Aquatic Ecological	52 / 55 33 / 55	10 / 10 6 / 10
Manganese	44 / 44	Resource Damage	41 / 44	10 / 10
Nickel	69 / 72	Resource Damage Aquatic Ecological	14 / 72 57 / 72	8 / 14 12 / 14
Lead	64 / 75	Human Health Resource Damage Aquatic Ecological	28 / 75 51 / 75 22 / 75	8 / 15 12 / 15 7 / 15
Vanadium	38 / 41	Human Health Resource Damage	16 / 41 30 / 41	5 / 10 9 / 10
Sulfate	57 / 57	Resource Damage	43 / 57	10 / 11
Copper	69 / 74	Human Health Resource Damage Aquatic Ecological	1 / 74 1 / 74 27 / 74	1 / 14 1 / 14 7 / 14

(a) Constituents listed in this table are present in at least one sample from at least one facility at a concentration that exceeds a relevant screening criterion. The conservative screening criteria used in this analysis are listed in Exhibit 2-3. Constituents that were not detected in a given sample were assumed not to be present in the sample.

(b) Human health screening criteria are based on cancer risk or noncancer health effects. "Human health" screening criteria noted with an "*" are based on 1×10^{-6} lifetime cancer risk; others are based on noncancer effects.

Ground-Water Release, Transport, and Exposure Potential

Section 12.3.2 describes documented cases of ground-water contamination at seven phosphoric acid plants located in Central Florida (3), Louisiana (2), North Carolina (1), and Idaho (1). These cases indicate that phosphogypsum and process wastewater constituents have been released to ground water at a number of facilities and, at some sites, have migrated off-site to potable wells in concentrations that are well above hazard criteria. Based on the analysis of the damage case evidence, presented below, EPA concludes that management of phosphogypsum and process wastewater in stacks and ponds can release contaminants to the subsurface, and depending on the hydrogeologic setting and ground-water use patterns, threaten human health via drinking water exposures or render ground-water resources unsuitable for potential use.

In the following paragraphs, EPA presents a region-by-region assessment of the hazards posed by phosphogypsum and process wastewater management. For purposes of this discussion, phosphoric acid plants are grouped into the following eight regions: Central Florida, North Carolina, Louisiana, Idaho, North Florida, Mississippi, Texas, and Wyoming. For each region for which ground-water damages have been documented, the Agency first builds the case that damages attributable to waste management have occurred, then, to the extent necessary, uses environmental setting information to assess the potential hazards (i.e., health risks and resource damage potential) at other facilities in the region. When no damage case information is available for a region, evidence of release potential is used in conjunction with environmental setting information to assess the hazards of potential releases from the plants in these regions.

Central Florida. The Florida Department of Environmental Regulation has initiated enforcement actions in response to ground-water contamination associated with the management of phosphogypsum and process wastewater at all 11 active phosphoric acid production facilities in Central Florida. At three of these facilities (i.e., Central Phosphates, Seminole, and IMC) contamination of the useable intermediate or Floridan aquifers exceeds primary drinking water standards for pH, gross alpha radiation, radium, sodium, total dissolved solids, sulfate, cadmium, chromium, fluoride, and arsenic beyond the permitted zone of discharge.[7] With the exception of sodium and total dissolved solids, all of these constituents were identified as potential constituents of concern in phosphogypsum or process wastewater. At the other eight facilities, contamination exceeding drinking water standards beyond the permitted zone of discharge has been detected only in the surficial aquifer. Two of the three damage cases for Central Florida phosphoric acid production plants presented in Section 12.3.2 (i.e., Central Phosphates and Seminole) discuss contamination of off-site ground water in formations that are used for water supplies. At Central Phosphates, a ground-water contamination plume in the Floridan aquifer extends six acres beyond the facility boundary; contamination of the surficial aquifer covers 28 acres outside the facility boundary. Twelve of 18 potable supply wells down-gradient of the Seminole plant sampled in 1988 contained at least one constituent at a concentration in excess of a drinking water standard. The owner of the phosphoric acid plant paid to have the affected properties connected to a public water supply. These ground-water contamination incidents indicate a high potential for ground-water releases from the phosphoric acid production plants in Central Florida. Except for the Gardinier facility, all operating plants in this area are within 1,000 meters of a public supply well and contamination of the Floridan aquifer at these sites could pose a public health threat via drinking water exposures. As demonstrated by the damage cases and violations of drinking water standards beyond the permitted zone of discharge, contaminants from these wastes can reach the useable aquifer in this area and migrate down-gradient toward potential exposure points.

North Carolina. Section 12.3.2 discusses ground-water contamination resulting from management of process wastewater at the phosphoric acid plant in Aurora, North Carolina. The extent of ground-water contamination at this site is not known with certainty, but fluoride and total dissolved solids concentrations in on-site wells exceed state drinking water standards in the surficial aquifer that is not extensively used and

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[7] The State of Florida allows discharges to ground water within a defined "zone of discharge." The horizontal extent of the zone typically is limited to the property boundary.

this plant could result in exposures at a residence located 180 meters down-gradient. Ground-water contamination potential appears high at the Pascagoula plant in Mississippi because ground water occurs at a depth of only 1.5 meters in this area. Human populations are not likely to be exposed to potential ground-water contaminants at this facility, however, because currently there are no residences or public supply wells within 1,600 meters down-gradient from the facility.

Texas and Wyoming. The potential for ground-water pathway risks at the Texas and Wyoming facilities is relatively low. Releases from the management units at the plant in Pasadena, Texas are limited to some extent because the stack at this facility is lined with recompacted local clay, and exposures to existing populations are unlikely because there is no residence or public supply well within 1,600 meters down-gradient from the facility. Similarly, the facility in Rock Springs, Wyoming poses a relatively low risk because its stack has a synthetic liner and the nearest down-gradient residence is quite distant (greater than 1,600 meters).

Surface Water Release, Transport, and Exposure Potential

The potential for the release of contaminants from phosphogypsum stacks and process wastewater ponds to surface water is also demonstrated by the damage cases presented in Section 12.3.2. These cases indicate that phosphogypsum and process wastewater management at plants in Central Florida, North Carolina, and Louisiana has resulted in the release of waste constituents to surface waters. Based on the analysis of the damage case evidence, it is clear that management of phosphogypsum and process wastewater in stacks and ponds can, and does, release contaminants to nearby surface waters. Depending on the distance to surface waters, the hydrogeologic setting, and surface water use patterns, EPA concludes that there is a potential for these released contaminants to migrate off-site and threaten human health via drinking water exposures, threaten aquatic life, or render surface water resources unsuitable for potential consumptive uses.

In the following paragraphs, EPA presents a region-by-region assessment of the hazards to surface water quality posed by phosphogypsum and process wastewater management. For each region for which surface water releases have been documented, the Agency first builds the case that releases from waste management units have occurred in the past and are typical of current practices, then uses environmental setting information to assess the potential hazards (i.e., health risks, risk to aquatic organisms, and resource damage potential) at other facilities in the region. When no damage case information is available for a region, evidence of release potential is used in conjunction with environmental setting information to assess the hazards of potential releases from the plants in these regions.

Central Florida. The damage cases presented in Section 12.3.2 indicate that unpermitted discharges of process wastewater and/or phosphogypsum stack seepage to surface waters have occurred at the Gardinier and Seminole plants in Central Florida. At the Gardinier facility, a number of releases from 1984 to 1988 have been documented. Releases to surface water from solid waste management at this plant arise from the discharge of untreated stack seepage from a drain system that is designed to intercept and collect leachate and effluent flowing laterally away from the stack. As indicated in the damage cases, fluorides, phosphorus, and radioactive substances are present at concentrations of concern in the effluent from this drain system. In addition, these unpermitted discharges had a pH of 1.5 to 2.2. In 1988, county and state inspectors discovered damaged vegetation on the shoreline of Hillsborough Bay along the west side of the gypsum stack where an unpermitted discharge was occurring. The affected area -- approximately one-half acre of saltwater marshes and wax myrtle -- had turned a brownish color,[10] presumably as a result of the discharge of untreated stack seepage. At the Seminole facility, surface water contamination has occurred via an unpermitted discharge to Bear Branch. Similar releases, or releases of contaminated ground-water discharging to surface water, could also occur at the eight other facilities in this area that are located near surface waters. At two of these

[10] Hillsborough County Environmental Protection Commission. October 6, 1988. Memorandum from Roger Stewart, Director, to Pam Iorio, Commissioner.

assessment. OAR estimates that the lifetime cancer risk to the maximally exposed individual (MEI) caused by the inhalation of radon in the vicinity of a phosphogypsum stack is $9x10^{-5}$. The MEI lifetime cancer risk from radon inhalation is greater than or equal to $1x10^{-5}$ at 17 of the 21 active phosphoric acid facilities. Only the plants in Pascagoula, Mississippi; Aurora, North Carolina; Rock Springs, Wyoming; and White Springs, Florida have an estimated MEI lifetime cancer risk from radon inhalation of less than $1x10^{-5}$.

Because phosphogypsum forms a crust on inactive areas of the stack as it dries, and because the active areas of the stack are moist, the emission of particulate matter by wind erosion is not thought to be a significant release mechanism.[12] Physical disturbance of dried phosphogypsum (e.g., by vehicles driving over the stacks), however, may be an important particle release mechanism. The OAR risk assessment estimated that the lifetime cancer risks from radionuclides in particle emissions from stacks range from $8x10^{-8}$ to $2x10^{-6}$. Based on these risk estimates, the OAR assessment concludes that the risk from inhaling radon emitted from phosphogypsum stacks is approximately two orders of magnitude greater than the cancer risk posed by the inhalation of fugitive dust from phosphogypsum stacks.

The OAR study did not investigate the cancer risk posed by other toxic constituents (i.e., arsenic and chromium) in phosphogypsum via particle inhalation. To supplement OAR's radiological assessment, EPA performed a screening level analysis of the risks posed by arsenic and chromium blown from phosphogypsum stacks. Using typical concentrations of arsenic and chromium in phosphogypsum, EPA calculated a lifetime cancer risk of $7x10^{-7}$ from exposure to these constituents in windblown phosphogypsum.[13] This analysis shows that the risk posed by arsenic and chromium in inhaled phosphogypsum particles is on the order of 35 percent of the risk posed by radionuclides in inhaled particles.

Based on the these findings, the Agency concludes that phosphogypsum stacks pose a considerable air pathway cancer risk primarily as a result of radon emissions from the stacks. By summing the risk estimates for radon inhalation, radionuclides in phosphogypsum particles, and arsenic and chromium in particles, EPA estimates a total air pathway lifetime MEI cancer risk of approximately $9x10^{-5}$ from exposure to phosphogypsum constituents. This risk is primarily from inhalation of radon emitted from stacks ($9x10^{-5}$) with minor contributions from the inhalation of phosphogypsum particles containing radionuclides ($2x10^{-6}$) and arsenic and chromium ($7x10^{-7}$). Based on the OAR estimates of risk from radon emitted from the stacks, the following plants appear to pose the greatest air pathway risks: Pasadena, Texas; Royster/Palmetto; Uncle Sam, Louisiana; Seminole; Central Phosphate; and Caribou, Idaho. As mentioned above, the stacks at Pascagoula, Mississippi; Aurora, North Carolina; Rock Springs, Wyoming; and White Springs, Florida pose lower MEI lifetime cancer risk (i.e., $< 1x10^{-5}$).

Proximity to Sensitive Environments

Eighteen of the 21 active U.S. phosphoric acid plants are located in or near environments that are vulnerable to contaminant release or that have high resource value. In particular:

- **The Seminole facility reported in its response to the National Survey on Solid Wastes from Mineral Processing Facilities that it is located in an endangered species habitat.**
- **The Royster/Palmetto and Pascagoula facilities are located within 6.5 and 7.8 miles, respectively, of the critical habitat of an endangered species. The two endangered species are the Florida Manatee and the Mississippi Sandhill Crane. Because of the**

[12] Ibid. p. 13-2.

[13] This risk estimate is based on a comparison of the dust inhalation risks posed by (1) median arsenic and chromium concentrations as determined by EPA's data base developed for this study and (2) average concentrations of radium-226, uranium-234, uranium-238, thorium-230, polonium-210, and lead-210 presented in the OAR analysis. To calculate the relative risks posed by these constituent concentrations, EPA assumed an exposure point concentration of windblown phosphogypsum in air, and applied standard cancer slope factors and exposure assumptions, such as those used in developing the screening criteria (see Section 2.2.2), to estimate the relative contributions of carcinogenic metals and radionuclides to the inhalation risks posed by airborne phosphogypsum.

12.3.2 Damage Cases

EPA conducted waste management case studies to assess the impacts of phosphogypsum and process wastewater management practices on human health and the environment. This review included 21 active and eight inactive phosphoric acid facilities. The inactive facilities are: Agrico, Hahnville, LA; Agrico, Fort Madison, IA; Albright & Wilson, Fernald, OH; JR Simplot, Helm, CA; Mobil Mining & Minerals, De Pue, IL; U.S. Agri-Chemicals Corp., Bartow, FL; Waterway Terminals, Helena, AR; and MS-Chemical located in Pascagoula, Mississippi. Documented damages attributable to management of phosphogypsum or process wastewater have been documented at more than ten facilities. Selected facilities are discussed in detail below.

Several factors play an important role in influencing the effectiveness of typical phosphogypsum and process wastewater management practices. Among these are water balance and soil stability. In Florida, for example, phosphogypsum dewatering and reduction of wastewater volumes are made possible due to the climate, specifically the relative amounts of precipitation and evaporation, in this region. In other areas, however, such as Louisiana, a net precipitation surplus necessitates a system dependent on planned discharges to surface waters. Soil stability appears to be much greater in Florida as well, where gypsum may be stacked to heights up to 60 meters (200 feet). In Louisiana, gypsum piles over 12 meters in height are generally considered unstable. In light of these differences, the case studies presented in this section are grouped by state.

Idaho

Nu-West Industries-Conda, Soda Springs, Idaho

The Nu-West plant is located approximately five miles north of Soda Springs, Idaho, near the abandoned mining town of Conda. The site covers approximately 650 hectares (1,600 acres). With the exception of a period from 1985 to 1987, the plant has been in operation since 1964.

Currently, Nu-West formulates and markets phosphate-based chemicals and fertilizers. The phosphogypsum waste is a by-product of the digester system, which produces ortho-phosphoric acid (P_2O_5) from phosphate ore. Gypsum is slurried with process water and pumped to two storage ponds on top of the gypsum stacks, which have been in use since 1964 and presently cover approximately 240 to 280 hectares (600 to 700 acres). The gypsum ponds are unlined; the stacks are about 46 meters (150 feet) above the natural ground surface. Drainage systems decant slurry water off the top of the higher ponds into ponds at lower elevations.

During March 1976, a dike surrounding the Nu-West cooling pond failed and released 400 acre feet of wastewater into the surrounding area. The water spread out and ponded on an estimated 20 to 40 hectares (50 to 100 acres) of farm land. The water then migrated via a natural drainage path, forming a small river that extended four miles to the south. Wastewater reportedly infiltrated into local soil and underlying bedrock along its overland migration path, but never entered a natural surface water body.

While the Idaho Division of Environment determined that dilution during spring run-off reduced surface concentrations of contaminants to within acceptable limits, the Caribou County Health Department recorded significant increases in ground-water concentrations of phosphate, cadmium, and fluoride immediately following the spill. Samples from a J.R. Simplot Company (Conda Operation) production well No. 10, located down-gradient from the Nu-West facility, show that before the spill occurred, levels of phosphate in the ground water averaged 100 mg/L, and rose to 1,458 mg/L after the spill. Levels of cadmium in the ground water averaged 0.01 mg/L before the spill and 0.239 mg/L after the spill, and levels of fluoride averaged 5 mg/L before, and 39 mg/L after, the spill, respectively.[14]

[14] EPA Region 10. 1988. Site Inspection Report to Nu-West Industries Conda Plant, Caribou, Idaho. TDD F10-8702-08. March, 1988.

Gardinier's on-site waste management units include two process water ponds (Nos. 1 and 2) and a gypsum stack. Process Water Pond No. 1 is an unlined pond that occupies 13 hectares (32 acres) and is 2 meters (6 feet deep); Process Pond No. 2 occupies 80 hectares and is 2.1 meters deep. The gypsum stack, which as of December 31, 1988 contained about 58 cubic meters (76 million cubic yards) of material, occupies an area of 150 hectares and is 61 meters high. The ponds on top of the gypsum stack occupy 16 hectares and are 2 meters deep. The typical pH of the liquid in the gypsum stack ponds is 1.8.[20]

Phosphogypsum is piped to the gypsum stack as a slurry mixture (approximately 30 percent solids). The gypsum settles from the slurry and the liquid is decanted for reuse in the manufacturing process. Water which seeps through the stack is collected in a perimeter drain that is buried at the toe of the stack. The drain carries the seepage water to a sump in the northeast corner of the gypsum stack where it is pumped to an evaporation pond located on part of the gypsum stack. Surface water run-off from the exterior slopes of the stack is discharged into Hillsborough Bay.[21]

Records at the Hillsborough County Environmental Protection Commission (HCEPC) cite environmental incidents at the Gardinier facility as far back as November 21, 1973, when HCEPC investigated a citizen's complaint and discovered 210 dead crabs in traps placed near the facility's northwest outfall. The pH of the outfall water was 2.9.[22,23]

Water quality violations attributable to Gardinier resulted in the following administrative actions: a Consent Order negotiated between the HCEPC and Gardinier on August 22, 1977; a Citation to Cease Violation and Order to Correct from HCPEC on November 8, 1984; a Warning Notice from the State of Florida Department of Environmental Regulation (FDER) on April 9, 1987; a Citation to Cease and Notice to Correct Violation from the HCEPC on May 26, 1988; and, a Warning Notice from FDER on October 18, 1988. These administrative actions were issued to Gardinier following unpermitted discharges from either the gypsum stack or the cooling water ponds.

The November 8, 1984 citation was issued for an untreated effluent discharge which occurred on October 8, 1984. The citation notes that "toe-drain effluent contains several thousand milligrams per liter of fluorides and phosphorus and up to 150 pico-curries per liter of radioactive substances. Also, its pH can be as low as 1.5 standard units."[24] A sample of the discharge on March 30, 1987, which resulted in the April 9, 1987 warning notice, shows that the pH was 1.9, total phosphorus was 6,740 mg/L and dissolved fluorides was 4,375 mg/L.[25] HCEPC analyzed a sample of the discharge which resulted in the October 18, 1988 warning notice and reported the following results: pH, 2.2; total phosphorus, >4,418 mg/L; and fluoride, 1,690 mg/L.[26]

The May 26, 1988 citation from HCEPC states that "available agency records indicate a considerable history of incidents of discharge resulting in exceedances of environmental standards and contamination of the air and waters of Hillsborough County. Enforcement in each case required remedial actions intended to

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[20] Gardinier, Inc. March 29, 1989. National Survey of Solid Wastes from Mineral Processing Facilities.

[21] Ardaman & Associates, Inc. September 23, 1983. Groundwater Monitoring Plan for East Tampa Chemical Plant Complex, Hillsborough County, Florida.

[22] Hillsborough County Environmental Protection Commission. May 6, 1988. Gardinier History.

[23] Hillsborough County Environmental Protection Commission. November 26, 1973. Interoffice Memo from Robert M. Powell to Richard Wilkins.

[24] Hillsborough County Environmental Protection Commission. November 8, 1984. Citation to Cease Violation and Order to Correct issued to Gardinier, Inc.

[25] Hillsborough County Environmental Protection Commission. March 31, 1987. Notice of Alleged Violation issued to Gardinier, Inc.

[26] Florida Department of Environmental Regulation. October 18, 1988. Warning Notice No. WN88-0001IW29SWD issued to Gardinier, Inc.

The CPI plant began operation in December 1965; principal products include phosphate fertilizer, sulfuric acid, and ammonia.[36] Phosphogypsum generated during the production of phosphoric acid is disposed onsite at the company's 170 hectare (410-acre) phosphogypsum stack. A 50 hectare unlined process water cooling pond completely surrounds the gypsum stack. The depth of the cooling pond is 2.4 meters (8 feet). As of December 31, 1988, the unlined gypsum stack was 111 feet high and contained approximately 70,000,000 tons of material. The top of the gypsum stack presently contains 8 ponding areas occupying a total area of approximately 105 hectares. Two designated areas on top of the stack, located in the middle, are used for disposal of non-hazardous waste materials, such as construction and demolition debris and non-hazardous chemicals.[37]

Activities at the Central Phosphates site have resulted in ground-water contamination in the surficial and upper Floridan aquifers. To date, it has been determined that the surficial aquifer and, to an undetermined extent, the Floridan aquifer have increased levels of fluoride, sodium, gross alpha radiation, heavy metals, sulfate, total dissolved solids, and nutrient compounds in excess of applicable guidance concentrations and/or state and federal drinking water standards. Contaminated ground water, primarily in the surficial aquifer, has migrated off-site under approximately 11 hectares (27.5 acres) of the Cone Ranch property, located south of the CPI facility.[38,39]

Quarterly ground-water sampling began at the Central Phosphates facility in April 1985. Based on the results of sampling from these wells in the second quarter of 1985, a warning notice was issued to the facility by the Florida Department of Environmental Regulation (DER) for violation of the primary drinking water regulations. Maximum contamination levels for sodium and chromium were exceeded in a down-gradient well in the Floridan aquifer and for sodium, chromium, and fluoride in a down-gradient well in the surficial aquifer.[40]

In June 1987 the West Coast Water Supply Authority provided DER with preliminary data from laboratory analysis of ground-water samples collected from the Cone Ranch property which indicated degradation of both the surficial and the upper Floridan aquifers.[41]

The final report on ground-water investigations conducted at Cone Ranch during May and June 1987, prepared by consultants to the West Coast Regional Water Supply Authority, identifies two areas of contamination on the Cone Ranch property. The report concludes that contamination in one area (designated Area A) was caused by a dike failure and resultant spill of process water from the Central Phosphates facility in 1969 and that contamination in another area (Area B) was caused by seepage of contaminated water from the recirculation pond located immediately north of the spill area.[42]

A consent order addressing the ground-water contamination problems at the site was drafted by DER during July of 1987 and signed by DER and Central Phosphates, Inc. on September 29, 1987. The consent order documents violations of primary and secondary drinking water standards for chromium, sodium, fluoride, gross alpha radiation, lead, and cadmium from a down-gradient well in the surficial aquifer. These violations occurred from May 6, 1985 through April 27, 1987; maximum values listed in the consent order for each

[36] Ardaman & Associates, Inc., September 21, 1987, Quality Assurance Project Plan, Central Phosphates, Inc., Plant City Phosphate Complex (part).

[37] Central Phosphates, Inc., March 29, 1989, "National Survey on Solid Wastes from Mineral Processing Facilities."

[38] West Coast Regional Water Supply Authority. May 11, 1989. Letter from M. G. Koromy, Hydrologic Services Manager, to M. Troyer, ICF, Inc.

[39] Ardaman & Associates, Inc., August 9, 1988, Contamination Assessment Report, Central Phosphates, Inc., Plant City Phosphate Complex, Hillsborough County, Florida.

[40] State of Florida, Department of Environmental Regulation, Warning Notice No. 29-85-07-182, July 17, 1985.

[41] Case Chronology for Central Phosphates, Inc., undated, Florida Department of Environmental Regulation enforcement files.

[42] Leggette, Brashears & Graham, Inc., July 15, 1987, West Coast Regional Water Supply Authority Hydrologic and Water Quality Site Investigation at Cone Ranch, Hillsborough County, Florida.

The north gypsum stack, which first received waste in 1954, occupies approximately 65 hectares (159 acres) at an average height of 9 meters (28 ft). This stack receives process wastewater, phosphogypsum, gypsum solids from "tank clean out," and filter cloths. As of December 31, 1988, the north gypsum stack contained 14 million short tons of material. The south gypsum stack, which first received waste in 1965, occupies approximately 164 hectares at an average height of 14 meters. As of December 31, 1988, the south gypsum stack had accumulated 38 million metric tons of material.[49]

Activities at the Seminole Fertilizer Corporation facility have resulted in elevated levels of several parameters in ground water in the surficial and intermediate aquifers. This contamination has affected potable water wells in the area, some of which have been replaced with water from the City of Bartow's public supply.[50]

Seminole maintains eight monitoring wells as part of the ground-water monitoring system required for its state permit. Seminole has stated that MW-3 and MW-7 are up-gradient, background wells. All other wells are listed as down-gradient. The facility's ground-water data from September 1986 through March 1989 show that the down-gradient wells repeatedly exceeded the water quality standards for pH, gross alpha radiation, radium-226 and radium-228, iron, manganese, TDS, sulfate, cadmium, chromium, lead, and fluoride.[51]

On March 8, 1988, the Florida DER issued a warning notice to W.R. Grace & Company for violations of its ground-water monitoring permit during the third and fourth quarters of 1987. The standards for gross alpha radiation, radium-226 and radium-228, and sodium had been exceeded in some ground-water samples.[52] The analytical results showed the following maximum concentrations for each parameter: gross alpha, 107 pCi/L; radium-226 & -228, 14.4 pCi/L; and, sodium, 657 mg/L.

In addition to on-site wells, neighboring potable water wells have also been adversely affected. Analytical data from May 1988 show that 12 of 18 wells contained at least one contaminant at levels above the drinking water standards. Contaminants that were found in the samples included arsenic, lead, sodium, gross alpha, radium-226 and radium-228, iron, pH, sulfate, and total dissolved solids.[53] Potable water wells near the facility were replaced by a public water supply from the City of Bartow; W.R. Grace apparently paid for the water supply line installation and connection to the affected water users.[54]

Seminole has also received a warning notice from the Florida DER for an unpermitted discharge of process water from the facility to Bear Branch.[55]

Florida - Other

Management histories similar to those described for the above Florida facilities have also been documented by the Florida DER for CF Chemicals, Inc. and Farmland Industries, Inc. in Bartow, FL, and for Conserv, Inc. in Nichols, FL.

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[49] Ibid.

[50] Florida Department of Environmental Regulation. September 29, 1988. Conversation Record between B. Barber, Drinking Water Section, and K. Johnson, FDER.

[51] Seminole Fertilizer Corporation. June 1, 1989. Copy of facility's ground-water monitoring data from 9/86 to 3/89.

[52] Florida Department of Environmental Regulation. March 8, 1988. Warning Notice No. 53-88-03-061.

[53] W.R. Grace & Company. June 3, 1988. Letter from Glenn Hall, Environmental Engineer, W.R. Grace & Co., to Kirk Johnson, Florida Department of Environmental Regulation and ground-water monitoring data for private potable wells adjacent to the facility.

[54] Florida Department of Environmental Regulation. September 29, 1988. Conversation Record between Bob Barber, Drinking Water Section, and Kirk Johnson, FDER.

[55] Florida Department of Environmental Regulation. May 30, 1984. Warning Notice No. 53-84-05-327.

Recent investigations have focused on leakage from cooling ponds Nos. 1 and 2, which have resulted in ground-water contamination of the first two water-bearing zones at the site.[62] In 1988, Texasgulf commissioned a Preliminary Contaminant Assessment for Cooling Ponds 1 and 2 in fulfillment of requirements for the renewal of a zero discharge permit. As part of this study, Texasgulf installed a total of 21 monitoring wells at the site in March and April of 1988. These monitoring wells included 10 wells at Cooling Pond No. 1, nine wells at Cooling Pond No. 2, and two background monitoring wells.[63]

Initial ground-water samples, obtained from monitoring wells at each of the cooling ponds during April 1988, show the results for the surficial aquifer and the Croatan Aquifer, which underlies the surficial aquifer at the site.[64] These results are displayed in Exhibit 12-6.

The first zone appears to be discharging to the facility's main effluent canal, while the direction of ground-water flow in the next zone is toward the northeast and Pamlico Sound.[65,66] Texasgulf subsequently began additional investigations to delineate the extent of contamination.[67] Initial results appear to support the initial conclusion that contamination is confined to the upper two water-bearing zones and that the Yorktown formation has prevented downward migration of contamination.[68] Texasgulf's Remedial Action Plan is currently under review by the NC-DEM.[69]

Louisiana

Agrico Chemical Co., Donaldsonville, Louisiana

AGRICO Chemical Company's Faustina Works phosphoric acid plant, which is located in Donaldsonville, Louisiana, began operations in 1974. Approximately 68 residents inhabit land within one mile of the facility. Receiving waters are the Mississippi River and the St. James Bayou.

Gypsum waste is slurried with process wastewater to a stacking area, where the solids settle out, and the water drains into adjacent ponds or clearwells.

This facility has experienced problems with elevated concentrations of phosphorus, fluoride and acid pH levels in surface and ground waters. Emergency discharges of untreated waters to surface water have occurred periodically throughout much of the 1980s; contamination of the ground water was reported in 1986.

EPA Region VI has prohibited the discharge of gypsum into the Mississippi River. About 1983, Agrico requested a modification of its NPDES Permit from EPA to allow Agrico to discharge gypsum to the Mississippi River under certain conditions. Agrico argued that the 1973 impoundment design was based on Florida facilities, and that the Louisiana climate and soils are different. Agrico stated that the height

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[62] Texasgulf. July 21, 1988. Preliminary Contamination Assessment at Cooling Ponds No. 1 and 2, Texasgulf Inc. Phosphate Operations, Aurora, North Carolina.

[63] Ibid.

[64] Texasgulf. July 21, 1988. Preliminary Contamination Assessment at Cooling Ponds No. 1 and 2, Texasgulf Inc. Phosphate Operations, Aurora, North Carolina.

[65] NC-DEM. December 13, 1988. Memorandum from B. Reid to A. Mouberry, Re: Texasgulf, Inc. Renewal of Permit No. 2982, Cooling Ponds Nos. 1 and 2.

[66] NC-DEM. January 17, 1989. Memorandum from R. Jones to C. McCaskill, Sup. State Engineering Review Unit, Permits and Engineering Branch, Re: Permit Renewal No. 2982 Cooling Ponds #1 and #2 Texasgulf, Inc.

[67] NC-DEM. December 13, 1988. Memorandum from B. Reid to A. Mouberry, Re: Texasgulf, Inc. Renewal of Permit No. 2982, Cooling Ponds Nos. 1 and 2.

[68] NC-DEM. June 3, 1989. Memorandum from B. Reid to R. Smithwick, Re: Texasgulf, Inc. Remedial Action Plan Cooling Ponds No. 1 and No. 2.

[69] Ardaman & Associates. February 6, 1990. Letter from T.S. Ingra and J.E. Garlanger to W.A. Schimming, Texasgulf, Re: Response to Deficiencies Noted by DEM Concerning the Cooling Pond No. 1 and No. 2 Remedial Action Plan and Proposed Revised Remedial Action Plan, Texasgulf Phosphate Operations.

spilled water was pumped to another gypsum holding stack; concern over the potential failure of this stack, however, led Agrico to discharge the untreated water to the Mississippi River over a period of several weeks. These discharges exceeded permit limits.[75,76] After the pond failure, water of pH 2 was found flowing in an on-site drainage ditch at approximately 20 gpm into the St. James Bayou. The large volume of released water had destroyed a dam that controlled flow from the drainage ditch into the St. James Canal. Agrico reinstalled the dam on April 22, 1983, and transferred the low pH water still in the dammed section of the ditch back to the gypsum pond system. Agrico checked the water in St. James Canal, concluding that it did not seem affected by the low pH water discharged to it as a consequence of the April 15, 1983 gypsum pond failure.[77,78]

Due to heavy rainfall, Agrico has continued to periodically perform emergency discharges of untreated stormwater from the clearwell, as occurred in March and again in June 1987. In its letter of notification, Agrico stated that "additional rain could result in catastrophic levee failure leading to loss of life, personal injury, or severe property damage."[79]

In March 1986, Agrico reported to LA DEQ that the water along the length of the north and east phosphogypsum perimeter ditches might be "slightly impacted" by phosphate, sulfate, and fluoride.[80]

In August 1986, Agrico submitted to LA DEQ a Hydrologic Assessment report for the Donaldsonville facility. LA DEQ regarded the reported situation as requiring corrective action: "Contamination of the shallow ground water, although by constituents which are not of great concern, poses a threat to drinking water. The Department's position is that the same physical characteristics that allow the contaminants to travel through the shallow silt faster than your theoretical model are present in the underlying clays."[81]

Even under non-emergency circumstances, Agrico has had difficulty keeping in compliance with NPDES permit limitations. In April 1987, an investigator reported that discharges from Agrico's inactive gypsum impoundment (Outfall 002) were in exceedance (up to 35 times) of permitted levels. However, the investigator determined that no action would be taken "until reissuance of new permit."[82]

In August 1987, LA DEQ determined that Agrico could not comply with the Louisiana Water Discharge Permit System that had been effective since March 1987.[83] LA DEQ issued an Administrative Order to Agrico to allow the facility to temporarily discharge water from gypsum stacks until standards were met.[84,85,86,87]

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[74](...continued)
[74] U.S. Environmental Protection Agency, Region 6. Undated. Report submitted by attorneys for Agrico Chemical Company, Kean, Miller, Hawthorne, D'Armond, McCowan & Jarman, and Hall, Estill, Hardwick, Gable, Collingsworth & Nelson, Re: Agrico Chemical Company, NPDES Permit LA0029769.

[75] Ibid.

[76] Louisiana DEQ. October 25, 1984. Memorandum from Patricia L. Norton, Secretary, to J. Dale Givens, Assistant Secretary, Re: Agrico Chemical Co.

[77] Agrico. April 29, 1983. Letter from R.A. Woolsey, Plant Manager to J. Dale Givens, Administrator DNR, Re: WPCD Inspection of the Faustina Facility on April 22, 1983.

[78] Louisiana DNR. May 11, 1983. Installation Inspection Forms, completed by Susan Stewart, Installation Representative.

[79] Agrico. June 17, 1987. Letter from R.A. Woolsey, Plant Manager to Myron O. Knudson, U.S. EPA Region 6 Director Water Management, Re: NPDES Permit Number: LA0029769. With attachment.

[80] Agrico. March 12, 1986. Letter from Susan P. Stewart, Manager, Energy and Environmental Control to Gerald Healy, Administrator, LA DEQ Solid Waste Division, Re: Agrico Phosphogypsum Site (P-0063) GD-093-0791.

[81] Louisiana DEQ. August 22, 1986. Letter from George H. Cramer, II, Administrator to Susan Stewart, Agrico Manager Energy and Environmental Control, Re: Hydrogeologic Assessment, Final Report GD-093-0791.

[82] U.S. Environmental Protection Agency, Region 6. 1986-88. NPDES Violation Summaries, from 10/18/86 - 4/12/88.

[83] Louisiana DEQ. August 17, 1987. Inter-office Letter, from O.S. Chambers to D.J. Miller, Re: Faustina Plant - Administrative Order.

[84] Ibid.

to the emergency bypass of the clearwell water.[94] The accumulation of facts throughout the documents suggests that excess water can cause failure of the gypsum stack or of the clearwell walls. During a discharge on February 27, 1987, Arcadian stated that the action was necessary "to prevent possible injury and severe property damage."[95] Such a discharge occurred again beginning on March 10 of the same year.[96] During these discharges, pH values ranged from 1.3 to 2.5; phosphorus concentrations from 3,688 mg/L to 7,960 mg/L; and fluorine concentrations from 6,188 to 14,649 mg/L.

An EPA NPDES Violation Summary, based on discharge monitoring reports from March 1986 to December 1987, showed that Outfall 003 violated effluent limits each month from at least December 1985 until August 1987. No enforcement action was taken for any of these violations. Since February of 1987, the EPA inspector has noted: "No action taken - waiting for an enforceable permit." Contaminant concentrations were similar to those listed above.

On December 8, 1988, EPA Region VI issued an Administrative Order to Arcadian regarding several violations, including the discharge on October 28 of that year of calcium sulfate run-off (Outfall 003) containing total phosphorus of 8,176 lbs/day, exceeding the permitted limit of 7,685 lbs/day.[97]

According to the LA DEQ, this facility has not experienced non-compliance or emergency bypass problems since those outlined in this section.

Louisiana -- Other

The management histories described for the above Louisiana facilities are also typical of the other Agrico facilities (Hahnville and Uncle Sam).

12.3.3 Findings Concerning the Hazards of Phosphogypsum and Process Wastewater

Based upon the detailed examination of the inherent characteristics of phosphogypsum and process wastewater arising from the production of wet process phosphoric acid, the management practices that are applied to these wastes, the environmental settings in which the generators of the materials are situated, and the numerous instances of documented environmental damage that have been described above, EPA concludes that current practices are inadequate to protect human health and the environment from the potential danger posed by these wastes.

Intrinsic Hazard of the Wastes

Review of the available data on phosphogypsum and its leachate constituent concentrations indicates that concentrations of 12 constituents exceed one or more of the screening criteria by more than a factor of 10, and that maximum chromium and phosphorus concentrations exceed the screening criteria by factors of greater than 1,000. In addition, two samples of phosphogypsum (out of 28) contained chromium concentrations in excess of the EP toxicity regulatory level, and phosphogypsum frequently contains uranium-238 and its decay products at levels that could present a high radiation hazard if the waste is allowed to be used in an

[94] Kean, et al, Attorneys at Law. November 6, 1984. Letter from M.N. Harbourt to J.V. Ferguson, EPA Region 6, Re: Notice of Anticipated Bypass, NPDES Permit No. LA0066257, Arcadian Corp., EPA File No. 7945-1.

[95] Arcadian. February 27, 1987. Letter from M.N. Harbourt to J. Van Buskirk, EPA Region 6 and J.D. Givens, LADEQ, Re: Notice of Anticipated Bypass and Request for Order Authorizing Bypass.

[96] Kean, et al, Attorneys at Law. March 19, 1987. Letter from M.N. Harbourt to J. Van Buskirk, EPA Region 6, Re: Arcadian Corporation - NPDES Permit Number: LA-0066257, EPA File Number: 7945-1.

[97] U.S. Environmental Protection Agency, Region 6. December 8, 1988. Cover letter from M.O. Knudson to H.J. Baker, Arcadian, Re: Administrative Order Docket No. VI-89-043, NPDES Permit No. LA0066257. 12/8/88. (Administrative Order attached).

disposed in stacks or in mined-out areas, effectively prohibiting use as a construction material or agricultural soil supplement.[98]

Under the Clean Water Act, EPA has the responsibility for setting "effluent limitations," based on the performance capability of treatment technologies. These "technology based limitations," which provide the basis for the minimum requirements of NPDES permits, must be established for various classes of industrial discharges, including a number of mineral processing categories.

Permits for mineral processing facilities may require compliance with effluent guidelines based on best practicable control technology currently available (BPT) or best available technology economically achievable (BAT). BPT effluent limitations of process wastewater from wet-process phosphoric acid, normal superphosphoric acid, and triple superphosphoric acid include (40 CFR 418.12(c)):

Pollutant	Daily Maximum	Monthly Average
Total Phosphorus	105 mg/L	35 mg/L
Fluoride	75 mg/L	25 mg/L
Total Suspended Solids	150 mg/L	50 mg/L

Effluent limitations concerning the concentrations of pollutants contained in (1) the discharge of contaminated non-process wastewater after application of BPT and BAT (40 CFR 418.12(d) and 418.13(d)), (2) discharges of process wastewater related to phosphoric acid production from existing sources after application of BAT (40 CFR 418.13(c)), and (3) process wastewater from defluorination of phosphoric acid after application of BPT and BAT are identical and as follows (40 CFR 422.52(c) and 422.53(c):[99]

Pollutant	Daily Maximum	Monthly Average
Total Phosphorus	105 mg/L	35 mg/L
Fluoride	75 mg/L	25 mg/L

No discharges of process wastewaters from the production of phosphoric acid or from the defluorination of phosphoric acid are allowed from new sources.

In cases where the State does not have an approved NPDES program, such as Texas, Louisiana, and Florida, EPA Regional personnel have stated that EPA applies the above guidelines. However, EPA may also adopt State water quality standards for the management of these discharges, if applicable. In Idaho, which also does not have an approved NPDES program, the Federal guidelines listed above would apply. EPA Regional staff have not been available to confirm current policy regarding discharges from phosphoric acid facilities. The State of Florida does not currently have an EPA-approved NPDES program. Therefore, existing Federal regulations concerning the management of wastes from the production of phosphoric acid, would apply for facilities in this State. Wastes from phosphoric acid production are subject to the effluent limitation guidelines set forth in 40 CFR Part 418 Subpart A.

The Chevron Chemical Company phosphoric acid facility located in Rock Springs, Wyoming is situated on federal lands managed by the Bureau of Land Management (BLM). The Federal Land Policy and Management Act of 1976 (FLPMA, 43 USC 1732, 1733, and 1782) authorizes BLM to regulate mining

[98] On April 10, 1990 EPA published a Notice of Limited Reconsideration that provided a limited class waiver that allows continued use of phosphogypsum for agricultural uses for the duration of the current growing season, but not to extend beyond October 1, 1990. This notice also solicited comment on alternative uses of phosphogypsum, i.e., management practices other than disposal.

[99] The limitations for defluorination process wastewater also include daily maximum limits of 150 mg/L and 6-9 and monthly average limits of 50 mg/L and 6-9 for TSS and pH respectively.

12.5 Waste Management Alternatives and Potential Utilization

12.5.1 Waste Management Alternatives

Waste management alternatives, as discussed below, include alternative processes for manufacturing phosphoric acid and methods of purifying (i.e., reducing concentrations of radionuclides and/or other contaminants) the phosphogypsum so that it can be safely used in agriculture or construction. Direct recycling of phosphogypsum is not a viable alternative, because the phosphogypsum itself cannot be used in the production of phosphoric acid, although it is already common practice to recycle the process water used to slurry the phosphogypsum. One exception to this, as is discussed briefly in the section on utilization, is the production of sulfur dioxide (SO_2) by the thermal decomposition of phosphogypsum, which can be recycled to the manufacturing process as sulfuric acid.

Process Alternatives for Manufacturing Phosphoric Acid

There are a number of variations of the basic wet-acid process used to manufacture phosphoric acid. These alternative processes are considered in this section because the phosphogypsum that they generate may differ in its degree of hydration (hemihydrate vs. dihydrate) at the time of generation, which can determine which purification methods can be applied to the phosphogypsum, and how efficiently they can remove the impurities. In addition, the amount of preprocessing required before some types of utilization (e.g., as wall board or plaster) can also vary with the production process used. Unfortunately, there is insufficient data available to attempt an evaluation the volume, composition, or potential hazard(s) of the phosphogypsum generated by the different processes. Consequently, this discussion focuses on the differences that could be relevant to the subsequent treatment, utilization, or disposal of phosphogypsum generated by the different production processes.

Description

The processes to be discussed are the classic Prayon and Nissan-H processes which generate the dihydrate form of phosphogypsum ($CaSO_4 \cdot 2H_2O$); and the Central-Prayon and Nissan-C processes, which generate the hemihydrate form of phosphogypsum ($CaSO_4 \cdot ½H_2O$).

In the classic Prayon process, the dihydrate phosphogypsum is filtered out of the solution produced by the digestion of phosphate rock by sulfuric acid. The phosphogypsum is then pumped as a slurry to gypsum stacks for disposal.[100,101]

In the Central-Prayon process, the dihydrate phosphogypsum is filtered out of the solution produced by the digestion of phosphate rock by sulfuric acid. The phosphogypsum is converted to the hemihydrate form by heating it and adding sulfuric acid, whereupon the hemihydrate/phosphogypsum is extracted from the acid slurry by counter-current washing, and the liquid is recycled to the phosphate rock digestion process, and the hemihydrate slurry being sent to the stacks for disposal.[102]

In the Nissan-H process, the phosphate rock is digested by sulfuric acid at a high temperature which causes most of the phosphate rock to decompose and the hemihydrate form of phosphogypsum to be generat-

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[100] Pana, N., Utilization of the Phosphogypsum Produced in the Fertilizer Industry, UNIDO/IS.533, United Nations Industrial Development Organization (UNIDO), May 1985, p. 30.

[101] Muehlberg, P.E., J.T. Reding, B.P. Shepherd, Terry Parsons and Glynda E. Wilkins, Industrial Process Profiles for Environmental Use: Chapter 22. The Phosphate Rock and Basic Fertilizer Materials Industry, EPA-600/2-77-023v, Environmental Protection Technology Series, prepared for Industrial Environmental Research Laboratory, ORD, U.S. Environmental Protection Agency, February 1977, p. 21.

[102] Ibid., p. 31.

ed.[103] The hemihydrate slurry is cooled and recrystallized to dihydrate by using seed crystals of dihydrate phosphogypsum. This recrystallization step results in the formation of phosphogypsum crystals which can be easily filtered, and are believed to be of sufficient quality to be utilized in building materials without additional treatment.[104,105]

The Nissan-C process is very similar to the Nissan-H process, the main difference being that the hemihydrate slurry is recrystallized by both cooling it and changing its acid concentration, which results in phosphoric acid concentrations of 45-50 percent without evaporation (as opposed to the 30-35 percent normally produced by the dihydrate processes) and in a higher quality phosphogypsum.[106]

Current and Potential Use

It is uncertain which of the above processes are used by each of the phosphoric acid facilities, although EPA believes that at least two or three of the facilities use one of the processes (Central-Prayon or Nissan-C) which generate hemihydrate phosphogypsum, and that the rest of the facilities use one of the processes (classic Prayon or Nissan-H) which generate dihydrate phosphogypsum.

There do not appear to be any insurmountable obstacles preventing any of the facilities from using any of the available production processes. Some of the reasons why particular facilities use, or have converted to, a particular process have been that the hemihydrate processes are more energy efficient because the phosphoric acid that they produce is more concentrated (hence, requires less evaporative concentration, which is energy-intensive), and that the dihydrate processes are easier to control and maintain. If it becomes necessary to reduce the radionuclide content in the phosphogypsum (see the discussion of phosphogypsum purification below) so that it could be utilized rather than disposed (see section 12.5.2), facilities might have more incentive to begin using one of the processes which generate hemihydrate phosphogypsum, since the two purification methods which employ acid digestion require anhydrite or hemihydrate phosphogypsum.

Purification of Phosphogypsum

Utilization of phosphogypsum in construction and agriculture is constrained by the presence of impurities and hazardous constituents in the waste. Constituents such as radium-226 and arsenic may need to be removed because of the hazards they may present to human health and the environment, while phosphates and fluorides need to be removed for technical reasons related to the methods of utilization. The impurities include insolubles such as silica sand and unreacted phosphate ore; occluded water soluble phosphoric acid and complex fluoride salts; and interstitially trapped ions within the phosphogypsum crystal lattice, such as HPO_4^{2-}, AlF_5^{2-}, and radioactive radium-226.[107]

Description

Several processes for removing radium-226, as well as the other impurities, have recently been developed.[108,109] These processes involve either acid digestion of the phosphogypsum or simple physical removal of the more radioactive portions of the phosphogypsum.

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103 Ibid., p. 14.

104 Ibid., p. 16.

105 The absence of supporting data has prevented EPA from evaluating the validity of this statement.

106 Muehlberg, op. cit., p. 18.

107 Palmer, J.W, and J.C. Gaynor, Phosphogypsum Purification, USG Corporation, Libertyville, Illinois, May 30, 1985, p. 1.

108 Ibid.

109 Palmer, J.W., Process for Reducing Radioactive Contamination in Phosphogypsum, U.S. Patent 4,338,292 to USG Corporation, June 14, 1983, p. 2.

Exhibit 12-7
Effect of Purification Methods on Ra-226 Concentrations in Phosphogypsum, Listed by State

State	Phosphogypsum Generated in 1988 (MT)[a]	Observed Ra-226 Content in Phosphogypsum (pCi/g)[d]	Ra-226 Content After Purification by Physical Separation (pCi/g)	Ra-226 Content After Purification by Acid Digestion	
				Using Anhydrite Phosphogypsum (pCi/g)	Using Hemihydrate Phosphogypsum (pCi/g)
Florida	28,777,000	5.9 - 30[b,c]	4 - 27	3	1
Idaho	2,846,000	7.9 - 23[d]	6 - 16	3	1
Louisiana	7,280,000	1.4 - 257[d]	1 - 180	3	1
Mississippi	474,000	5.8 - 30[b,e]	4 - 27	3	1
North Carolina	5,425,000	4.3 - 4.8	9	3	1
Texas	1,157,000	13.2 - 15.0	9 - 10.6	3	1
Wyoming	800,000	—	—	3	1

(a) Company responses to EPA's "National Survey of Solid Wastes from Mineral Processing Facilities," conducted in 1989.
(b) 1989 Waste Characteristic data provided by industry in response to RCRA 3007.
(c) May, Alexander and John W. Sweeney, Assessment of Environmental Impacts Associated with Phosphogypsum in Florida, prepared for the U.S. Department of Interior, Bureau of Mines, RI 8639, p. 8.
(d) EG&G Idaho, Inc., Evaluation of Relative Hazards of Phosphate Products and Wastes, prepared for the U.S. Department of Energy, DOE Contract No. DE AC07-76ID01570, March 1984, p. 18.
(e) The phosphate rock originates in central Florida.

of physical separation should be able to reduce the radium-226 concentration below the 10 pCi/g threshold in most of the phosphogypsum generated.

Therefore, it appears that only a small portion of phosphogypsum produced annually could be sufficiently purified by the physical separation technique. In order to reduce all the phosphogypsum to a level at or below the 10 pCi/g threshold, the purification methods using acid digestion would be required.

Factors Affecting Regulatory Status

The residuals generated by the acid digestion purification of phosphogypsum have a specific activity of up to 600 pCi/g[111], and while the purification process generates a relatively low volume of waste, it is very concentrated and may pose disposal problems that equal or outweigh those associated with the original phosphogypsum. At this time, however, EPA does not have sufficient information to articulate a position on the regulatory status of this residue. One waste management strategy which has been suggested for immobilizing the radionuclides is to blend it with waste phosphatic clay suspensions (slimes) and allow the mixture to solidify.[112] The discussion in Section 12.5.2 on utilization of phosphogypsum in mine reclamation provides an explanation of this approach.

While no information was found on the volume or radium-226 concentration of the waste resulting from the physical separation method, it too would produce residuals with relatively high concentrations of radium-226.

12.5.2 Utilization

Described below are a number of alternatives for utilizing phosphogypsum. Some of these uses, such as agriculture and mine reclamation, already utilize significant amounts of phosphogypsum. Other alternatives (e.g., use as a construction material) have been shown to be technically feasible, but for a variety of reasons have not moved beyond the developmental stage of field testing in the U.S.

At the time of this assessment, it is uncertain which, if any, of the uses discussed below will be allowed. EPA currently requires that phosphogypsum be disposed in stacks or mines, which precludes alternative uses of the material,[113] except for a limited class waiver for the agricultural use of phosphogypsum, which will be in effect until October 1, 1990. EPA has, however, announced a limited reconsideration of the rule requiring the disposal of phosphogypsum in stacks or mines, and has also given notice of a "proposed rulemaking by which EPA is proposing to maintain or modify the rule to, alternatively or in combination, (1) make no change to 40 CFR Part 61, subpart R, as promulgated on October 31, 1989, (2) establish a threshold level of radium-226 which would further define the term "phosphogypsum", (3) allow, with prior EPA approval, the use of discrete quantities of phosphogypsum for researching and developing processes to remove radium-226 from phosphogypsum to the extent such use is at least as protective of public health as is disposal of phosphogypsum in mines or stacks, or (4) allow, with prior EPA approval, other alternative use of phosphogypsum to the extent such use is at least as protective of public health as is disposal of phosphogypsum in mines or stacks."[114]

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[111] Moisset, J., Location of Radium in Phosphogypsum and Improved Process for Removal of Radium from Phosphogypsum, Platres Lafarge (France) (date not known).

[112] Palmer, J.W. and J.C. Gaynor, Method for Solidifying Waste Slime Suspensions, U.S. Patent 4,457,781 to USG Corporation, July 3, 1984, p. 4.

[113] 54 FR 51654, December 15, 1989.

[114] 55 FR 13482, April 10, 1990.

In a different study, data on the radium-226 content of phosphogypsum samples from Florida and Idaho were used to calculate the increase in radium-226 content of soil to which phosphogypsum is applied. The study found that the application of 1 metric tons of 40 pCi/g phosphogypsum to 1 hectare of land, and mixed in the soil to a depth of 20 cm, would increase the radium-226 content of the soil by 0.01538 pCi/g. Therefore, the application of phosphogypsum for the purpose of sulfur fertilization (assuming an application rate of 0.1 metric tons per hectare per year) would result in an increase in the soil's radium-226 content of 0.0015 pCi/g-year, while the application of phosphogypsum for the purpose of sediment control (assuming an application rate of 4.0 metric tons per hectare per year) would result in an increase in the soil's radium-226 content of 0.62 pCi/g-year. Over a period of 100 years, these application rates would cause radium-226 concentrations to increase by 0.15 and 6.2 pCi/g, respectively, as compared to the typical radium-226 content in soils of 1-2 pCi/g.[117]

Feasibility

It is uncertain whether future regulations will completely preclude the agricultural uses of phosphogypsum, or only limit when and how it may be used.[118] Since many farmers have continued to use phosphogypsum despite the prospect of new regulatory prohibitions, and concerns about the radium-226 found in phosphogypsum,[119] it is not unreasonable to assume that farmers would continue to use it in the future, if it remains economically competitive. However, if it becomes necessary to reduce the radium-226 content before it can be used, the additional costs are likely to reduce the amount of phosphogypsum used if purification would make phosphogypsum more expensive than the materials it competes with.

Utilization of Phosphogypsum for Mine Reclamation

Description

An alternative to the direct disposal of phosphogypsum in stacks and/or mines has been developed in which phosphogypsum is mixed with phosphatic clay suspension (a waste stream from the beneficiation of phosphate rock), and placed in a disposal site (generally the phosphate mine) where it consolidates and can be reclaimed by planting grass and trees.[120] The process begins by increasing the solids content of the phosphatic clay suspension to 10 percent; a portion of the dewatered clay is pumped to the phosphoric acid plant and mixed with phosphogypsum from the belt-filters; the clay-phosphogypsum mixture (blend) is put into a blend tank and additional phosphogypsum from the stacks and phosphatic clay suspension are added until there are approximately 3 parts phosphogypsum to 1 part clay; the resulting blend (35 percent solids) is pumped as a slurry to the disposal site; and after the blend has had approximately one year to dewater and consolidate, it is possible to plant grass and trees on the surface.[121]

[117] Barsa, R.G., Agricultural Impact of Radium-226 in Gypsum Derived from Phosphate Fertilizer Manufacture, October 1976.

[118] 55 FR 13482 April 10, 1990.

[119] Personal communication, Dr. Gary Gascho, University of Georgia Experiment Station, April 25, 1990.

[120] Palmer, Jay W. and A.P. Kouloheris, Slime Waste Solidification with Hydratable Calcium Sulfate, paper to be presented at the University of Miami Civil Engineering Department Seminar on Phosphogypsum on April 25-27, 1984, p. 279.

[121] Personal communication, William A. Schimming, Environmental Affairs Manager, Texasgulf Inc., April 30, 1990.

Feasibility

It is likely that this management alternative will have a greater level of social acceptability than current practices, which result in large, barren disposal areas. EPA does not believe that the rule requiring that phosphogypsum be disposed in stacks or mines (thereby precluding alternative uses of the material) will preclude the use of this alternative, since it does not involve putting the phosphogypsum-clay blend anywhere except in stacks and mines.[130] The greatest barriers to the use of this alternative appear to be geographic and technical in nature (see the discussion on Current and Potential Use), although there may also be some economic barriers (e.g., current practices are less expensive).

Utilization of Phosphogypsum in Construction Materials

Phosphogypsum can be utilized as a construction material in a variety of ways. The two major areas of use are in building materials and highway construction. This section describes and evaluates applications in both areas.

Description

Phosphogypsum has the same basic properties as natural gypsum and may be used as a substitute for natural gypsum in the manufacture of commercial construction products. Approximately 70 percent of the natural gypsum used in the U.S. is for the manufacture of gypsum board or partition panels. Another 19 percent is used as an additive to cement. Addition of natural gypsum to cement retards the setting time, counteracts shrinkage, speeds the development of initial strength, and increases long-term strength and resistance to sulfate etching. The remaining 11 percent of all natural gypsum use is attributable to agricultural uses (7 percent) and miscellaneous uses including the manufacture of plaster and cement.[131] Phosphogypsum generated from the classic Prayon process for phosphoric acid production must be purified by removing phosphates, fluorides, and other impurities for it to be successfully used in the production of building materials or as an additive to cement, whereas phosphogypsum from the Central-Prayon, Nissan-H, and Nissan-C processes may often be used directly as natural gypsum substitutes without the need for purification.

Phosphogypsum from all four processes may often be used in the manufacture of cement without additional purification. One of the most promising processes for utilizing phosphogypsum in the manufacture of portland cement is the OSW-Krupp process, a modification of the Müeller-Kühne process. In this process, phosphogypsum is dried in a rotary dryer and mixed with coke, sand, and clay. The mixture is then ground, pelletized, and fed to a rotary kiln where SO_2 and clinker are formed. The SO_2 can then be passed to an acid conversion plant to produce H_2SO_4, which may be recycled to the phosphoric acid production process. The clinker is cooled and metered along with natural gypsum onto a belt conveyor feeding into a finished cement mill.[132]

Phosphogypsum generated from all phosphoric acid production processes may be used successfully as a road base, when stabilized with 5-10 percent portland cement or 15-25 percent fly ash, mixed with granular soil and compacted for secondary road construction, used in a portland cement concrete mixture and compacted to form roller-compacted concrete for paving driveways and parking areas, or used as fill and sub-base material.[133,134]

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130 54 FR 51654 December 15, 1989.

131 Chang, W.F. and Murray I. Mantell, Engineering Properties and Construction Applications of Phosphogypsum, Phosphate Research Institute, University of Miami Press, Coral Gables, Florida, 1990, p. 6.

132 Zellars-Williams Company, A.P. Kouloheris, principal investigator, Evaluation of Potential Commercial Processes for the Production of Sulfuric Acid From Phosphogypsum, Publication No. 01-002-001, Florida Institute of Phosphate Research, October 1981, pp. 18, 22.

133 Ibid., pp. 177-189.

above. As is discussed at the beginning of this section, EPA is currently considering a number of regulatory options, two of which could conceivably allow phosphogypsum to be utilized in construction.

If a threshold level of radium-226 is established (regulatory option (2)), it may be possible to utilize the phosphogypsum after purification (i.e., reducing the radium-226 content) (see section 12.5.1). Assuming that the proposed threshold level of 10 pCi/g were adopted, and the physical separation method described in section 12.5.1 were used to purify the phosphogypsum, the data displayed in Exhibits 12-7 and 12-8 suggest that some of the phosphogypsum generated in the states of Florida, Idaho, Louisiana, Mississippi, North Carolina, and Texas might have a radium-226 content lower than the threshold value of 10 pCi/g. However, the available data are not detailed enough for EPA to estimate how much of the purified phosphogypsum would contain less radium-226 than the threshold level, or if phosphogypsum with a sufficiently low radium-226 concentration would be close enough to the potential markets for it to be economically competitive. Similarly, if one of the acid digestion purification methods (see section 12.5.1) were used to purify the phosphogypsum, the data in Exhibits 12-7 and 12-8 suggest that all of the phosphogypsum generated in the U.S. would have radium-226 concentrations lower than the threshold level.

It is not clear whether adoption of the fourth regulatory option would preclude the use of phosphogypsum in construction materials. It is likely that the determination of whether a particular use of phosphogypsum is at least as protective of human health and the environment as phosphogypsum disposal in stacks or mines, would have to be made on a case by case basis.

Feasibility

Even if it is allowed by the regulations, it is uncertain whether a significant amount of phosphogypsum would be utilized as a construction material. The basis for this conclusion is that even before the current constraints on the utilization of phosphogypsum were imposed, very little phosphogypsum has been used in construction; consumer concern over indoor radon is likely to discourage the use of products made from phosphogypsum, which may be perceived as a significant source of radon even if purified; natural gypsum is readily available in most parts of the U.S.; and there is concern about the exposure (e.g., via leaching and subsequent ingestion, see section 12.3.1) of humans to the hazardous constituents in phosphogypsum.

12.6 Cost and Economic Impacts

Section 8002(p) of RCRA directs EPA to examine the costs of alternative practices for the management of the special wastes considered in this report. EPA has responded to this requirement by evaluating the operational changes that would be implied by compliance with three different regulatory scenarios, as described in Chapter 2. In reviewing and evaluating the Agency's estimates of the cost and economic impacts associated with these changes, it is important to remember what the regulatory scenarios imply, and what assumptions have been made in conducting the analysis.

The focus of the Subtitle C compliance scenario is on the costs of constructing and operating hazardous waste land disposal units. Other important aspects of the Subtitle C system (e.g., corrective action) have not been explicitly factored into the cost analysis. Therefore, differences between the costs estimated for Subtitle C compliance and those under other scenarios (particularly Subtitle C-Minus) are less than they might be under an alternative set of conditions (e.g., if most affected facilities were not already subject to Subtitle C). The Subtitle C-Minus scenario represents, as discussed above in Chapter 2, the minimum requirements that would apply to any of the special wastes that are ultimately regulated as hazardous wastes; this scenario does not reflect any actual determinations or preliminary judgments concerning the specific requirements that would apply to any such wastes. Further, the Subtitle D-Plus scenario represents one of many possible approaches to a Subtitle D program for mineral processing special wastes, and has been included in this report only for illustrative purposes. The cost estimates provided below for the three scenarios considered in this report must be interpreted accordingly.

hazardous process water is assumed to be used to transport the phosphogypsum to the management unit. Because phosphoric acid production process wastewater is a dilute, aqueous liquid, that is usually corrosive and often EP toxic, the management practice of choice under Subtitle C is treatment (neutralization and/or metals precipitation). The scenario examined here involves construction of a Subtitle C surge pond (double-lined surface impoundment) which feeds a system of concrete impoundments in which treatment is performed. Following treatment, the effluent may be reused by the facility (e.g., to slurry fluorogypsum to the gypsum stack or impoundment) just as it is under current practice. The sludge is assumed to be non-hazardous and is assumed to be disposed of in an unlined disposal impoundment or landfill.

Subtitle C-Minus

Assumed practices under Subtitle C-Minus are identical to those described above for the full Subtitle C scenario, with the exception that some of the requirements for construction and operation of the hazardous waste surge pond have been relaxed, most notably the liner design requirements.

Subtitle D-Plus

Assumed practices under Subtitle D-Plus are identical to those described above for the Subtitle C-Minus scenario. Generators of process wastewaters are assumed to pose either moderate or high risk to ground water, even if, as is true in one case in the phosphoric acid sector, the environmental conditions indicate a low risk. Therefore, all facilities meet the same requirements under both Subtitle D-Plus and under Subtitle C-Minus; ground-water monitoring, a practice that is not required under the low risk Subtitle D-plus scenario, is assumed to be required in all cases.

Phosphogypsum

Subtitle C

Under Subtitle C standards, of hazardous waste that is managed on-site must meet the standards codified at 40 CFR Parts 264 and 265 for hazardous waste treatment, storage, and disposal facilities. The Agency has assumed that the phosphogypsum can and will be managed separately from the other special waste, process wastewater; non-hazardous process wastewater is assumed to be used to transport the phosphogypsum to the management unit. Because phosphogypsum is an inorganic solid that is transported in slurry form, the management practice of choice under Subtitle C is surface impoundment disposal. EPA has determined that because of Subtitle C closure requirements, existing waste management units (gypsum stacks) would not be permissible, because of the steep (nearly vertical) angles with which they are constructed. Closure of such units would require extensive contouring and regrading (so that they could be capped effectively), such that the total area occupied by the unit at closure would greatly exceed the space occupied during its operating life. The scenario examined here involves construction of a double-lined Subtitle C surface impoundment of significant size. The gypsum would be slurried to this impoundment in much the same way as it is currently slurried to gypsum stacks. Following settling of the suspended phosphogypsum, the transport water would be removed and piped back to the process operation for reuse, just as it is under current practice.

Subtitle C-Minus

Two primary differences are assumed to exist between full Subtitle C and Subtitle C-minus. The first is the assumption that facilities could use gypsum stacks if their use is less costly than using disposal impoundments. The second difference is the facility-specific application of tailored requirements based on potential risk to groundwater at affected facilities. Under the C-Minus scenario, as well as the Subtitle D-Plus scenario described below, the degree of potential risk of contaminating ground-water resources was used as a decision criterion in determining what level of protection (e.g., liner and closure cap requirements) would be necessary to protect human health and the environment. Ten of the 11 facilities assumed to generate

Exhibit 12-9
Compliance Cost Analysis Results for Management of Process Wastewater from Phosphoric Acid Production[(a)]

Facility	Baseline Waste Management Cost	Incremental Costs of Regulatory Compliance								
		Subtitle C			Subtitle C-Minus			Subtitle D Plus		
	Annual Total ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)
Agri Chem - Bartow, FL	298	5,840	15,400	2,311	5,537	13,781	2,056	5,434	13,781	2,056
Agrico Chemical - Donaldsonville, LA	287	12,131	39,213	5,851	11,877	36,708	5,477	11,677	36,706	5,477
Agrico Chemical - Mulberry, FL	298	11,088	32,230	4,811	10,654	29,795	4,446	10,551	29,795	4,446
Agrico Chemical - Uncle Sam, LA	314	15,541	50,321	7,509	14,975	47,193	7,042	14,872	47,193	7,042
Arcadian - Geismar LA	247	5,375	16,180	2,414	5,162	15,022	2,241	5,059	15,022	2,241
Central Phosphates - Plant City, FL	389	22,313	68,915	10,283	21,080	62,058	9,260	21,080	62,058	9,260
CF Chemicals - Bartow, FL	600	6,850	19,438	2,900	6,610	17,578	2,623	6,507	17,578	2,623
Chevron - Rock Springs, WY	381	4,780	12,430	1,858	4,504	11,043	1,648	4,402	11,043	1,648
Conserv - Nichols, FL	261	3,213	8,004	1,194	3,048	7,110	1,061	2,946	7,110	1,061
Farmland Industries - Bartow, FL	295	6,817	18,332	2,735	6,485	16,399	2,447	6,362	16,399	2,447
Gardinier - Riverview, FL	636	16,844	51,094	7,624	15,633	46,047	6,871	15,530	46,047	6,871
IMC Fertilizer - Mulberry, FL	328	28,309	79,087	11,798	25,619	75,236	11,226	25,516	75,236	11,226
Mobil Mining - Pasadena, TX	276	8,023	24,179	3,608	7,638	22,068	3,293	7,535	22,068	3,293
Nu-South Industries - Pascagoula, MS	510	7,871	26,081	3,893	7,401	24,013	3,583	7,398	24,013	3,583
Nu-West - Soda Springs, ID	289	5,743	16,424	2,451	5,464	14,899	2,223	5,361	14,899	2,223
Occidental Chemical - White Springs, FL	624	12,789	36,856	5,490	12,256	33,912	5,060	12,153	33,912	5,060
Royster - Mulberry, FL	524	6,508	17,902	2,671	6,192	16,183	2,415	6,089	16,183	2,415
Royster - Palmetto, FL	540	10,710	36,137	5,392	10,197	33,262	4,963	10,094	33,262	4,963
Seminole Fertilizer - Bartow, FL	620	12,946	37,188	5,549	12,434	34,356	5,126	12,331	34,356	5,126
JR Simplot - Pocatello, ID	655	5,369	14,959	2,232	5,093	13,452	2,007	4,990	13,452	2,007
Texasgulf - Aurora, NC	303	18,186	62,188	9,276	17,393	57,893	8,638	17,290	57,893	8,638
Total:	8,897	225,033	682,629	101,857	215,121	628,007	93,706	213,167	628,007	93,706
Average:	424	10,716	36,506	4,850	10,244	29,905	4,462	10,151	29,905	4,462

(a) Values reported in this table are those computed by EPA's cost estimating model and are included for illustrative purposes. The data, assumptions, and computational methods underlying these values are such that EPA believes that the compliance cost estimates reported here are precise to two significant figures.

Facilities evaluated here as generating potentially hazardous waste include those for which no sampling data exists

Exhibit 12-10
Compliance Cost Analysis Results for Management of Phosphogypsum from Phosphoric Acid Production[a]

Facility	Baseline Waste Management Cost	Incremental Costs of Regulatory Compliance								
		Subtitle C			Subtitle C-Minus			Subtitle D-Plus		
	Annual Total ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)
Agri Chem - Bartow, FL	409	17,310	90,808	13,549	11,780	80,101	8,868	11,645	64,067	9,560
Agrico Chemical - Mulberry, FL	1,087	41,366	220,518	32,804	20,456	110,917	16,560	11,906	66,627	9,942
Agrico Chemical - Uncle Sam, LA	3,858	99,755	534,388	79,737	66,381	343,515	51,257	62,242	352,204	52,553
Central Phosphates - Plant City, FL	1,547	185,043	985,329	147,023	30,180	184,700	24,575	17,887	101,203	15,101
Chevron - Rock Springs, WY	434	10,865	58,316	8,403	1,278	2,898	402	483	875	131
Gardinier - Riverview, FL	694	117,107	621,515	92,739	21,409	114,562	17,094	12,750	70,161	10,469
Mobil Mining - Pasadena, TX	982	46,859	247,207	36,886	12,877	88,198	10,178	7,420	40,059	5,977
Nu-South Industries - Pascagoula, MS	710	62,429	330,400	49,300	13,080	88,338	10,348	7,414	40,255	6,007
Nu-West - Soda Springs, ID	1,811	11,989	62,748	9,383	8,063	41,055	6,126	7,960	41,055	6,126
Occidental Chemical - White Springs, FL	1,298	27,712	149,079	22,245	18,918	100,310	14,968	18,613	100,310	14,968
Royster - Palmetto, FL	334	64,115	339,983	50,582	13,362	70,715	10,562	7,661	41,498	6,182
Total:	13,112	684,589	3,637,285	542,730	218,739	1,148,105	171,013	166,180	918,313	137,024
Average:	1,192	62,236	330,663	49,339	19,703	104,191	15,547	15,108	83,483	12,457

(a) Values reported in this table are those computed by EPA's cost estimating model and are included for illustrative purposes. The data, assumptions, and computational methods underlying these values are such that EPA believes that the compliance cost estimates reported here are precise to two significant figures.

Facilities evaluated here as generating potentially hazardous waste include those for which no sampling data exist.

Exhibit 12-11
Significance of Regulatory Compliance Costs for Management of Process Wastewater from Phosphoric Acid Production[a]

Facility	Subtitle C			Subtitle C-Minus			Subtitle D-Plus		
	CC/VOS	CC/VA	IR/K	CC/VOS	CC/VA	IR/K	CC/VOS	CC/VA	IR/K
Agri Chem - Bartow, FL	1.69%	1.87%	16.0%	1.60%	1.77%	14.2%	1.57%	1.74%	14.2%
Agrico Chemical - Donaldsonville, LA	3.08%	3.40%	35.5%	2.96%	3.28%	33.2%	2.95%	3.28%	33.2%
Agrico Chemical - Mulberry, FL	3.37%	3.74%	36.1%	3.23%	3.60%	32.4%	3.20%	3.56%	32.4%
Agrico Chemical - Uncle Sam, LA	2.83%	3.14%	32.8%	2.73%	3.03%	30.8%	2.71%	3.01%	30.8%
Arcadian - Geismar, LA	3.67%	4.08%	38.6%	3.53%	3.92%	36.8%	3.46%	3.84%	36.8%
Central Phosphates - Plant City, FL	3.91%	4.34%	43.2%	3.69%	4.10%	38.9%	3.69%	4.10%	38.9%
CF Chemicals - Bartow, FL	6.38%	7.03%	63.4%	6.02%	6.66%	57.3%	5.92%	6.56%	57.3%
Chevron - Rock Springs, WY	2.47%	2.78%	23.1%	2.34%	2.60%	20.5%	2.28%	2.54%	20.5%
Conserv - Nichols, FL	1.77%	1.97%	15.8%	1.66%	1.87%	14.1%	1.62%	1.80%	14.1%
Farmland Industries - Bartow, FL	1.55%	1.72%	14.9%	1.47%	1.63%	13.4%	1.45%	1.61%	13.4%
Gardinier - Riverview, FL	4.07%	4.52%	46.1%	3.86%	4.27%	40.6%	3.82%	4.26%	40.6%
IMC Fertilizer - Mulberry, FL	2.22%	2.46%	23.9%	2.16%	2.40%	22.7%	2.15%	2.39%	22.7%
Mobil Mining - Pasadena, TX	3.66%	4.09%	39.4%	3.46%	3.86%	38.0%	3.43%	3.81%	38.0%
Nu-South Industries - Pascagoula, MS	4.77%	5.31%	56.7%	4.54%	5.06%	52.2%	4.48%	4.98%	52.2%
Nu-West - Soda Springs, ID	2.61%	2.90%	26.6%	2.49%	2.76%	24.3%	2.44%	2.71%	24.3%
Occidental Chemical - White Springs, FL	1.98%	2.20%	20.5%	1.90%	2.11%	18.8%	1.88%	2.09%	18.8%
Royster - Mulberry, FL	2.47%	2.74%	24.4%	2.35%	2.61%	22.0%	2.31%	2.57%	22.0%
Royster - Palmetto, FL	6.09%	6.76%	73.6%	5.79%	6.43%	67.7%	5.73%	6.37%	67.7%
Seminole Fertilizer - Bartow, FL	2.91%	3.23%	30.0%	2.80%	3.11%	27.7%	2.77%	3.08%	27.7%
JR Simplot - Pocatello, ID	2.49%	2.76%	24.8%	2.36%	2.62%	22.3%	2.31%	2.57%	22.3%
Texasgulf - Aurora, NC	2.01%	2.24%	24.7%	1.93%	2.14%	23.0%	1.91%	2.13%	23.0%

CC/VOS - Compliance Costs as Percent of Sales
CC/VA - Compliance Costs as Percent of Value Added
IR/K - Annualized Capital Investment Requirements as Percent of Current Capital Outlays

(a) Values reported in this table are based upon EPA's compliance cost estimates. The Agency believes that these values are precise to two significant figures.

Facilities evaluated here as generating potentially hazardous waste include those for which no sampling data exists.

use is in part discretionary, and selection of types and amounts of various fertilizer types can vary. Despite its fairly competitive position versus other world suppliers, therefore, the profit margins for phosphoric acid and phosphate rock may often be somewhat restricted.

Throughout the 1990's, domestic production of phosphoric acid is expected to remain constant, while foreign production is expected to increase by less than 2.5 percent per year. Both domestic and foreign demand for phosphoric acid are expected to grow by less than 2.5 percent per year during the 1990's.

Potential for Compliance Cost Pass-Through

Labor Markets. There has been considerable restructuring in the phosphate industry with some associated wage concessions. The potential for further labor concessions is not known.

Lower Prices to Suppliers. The ability to pass through costs to input markets is not particularly relevant because the major phosphoric acid producers are integrated.

Higher Prices. Higher prices are generally difficult to impose except during periods of worldwide prosperity. The price of phosphate rock and phosphoric acid depends a great deal on competition from Morocco, the price of alternative fertilizers, and the use of slow release fertilizers.

Evaluation of Cost/Economic Impacts

EPA believes that regulation of phosphogypsum as a hazardous waste under RCRA Subtitle C would impose potentially severe impacts on facilities at which this waste exhibits EP toxicity; the number of such facilities is highly uncertain but is at least one and likely to be two or three. Mitigation of the severe cost impacts that would be experienced by the affected phosphoric acid producers under Subtitle C would be unlikely, because of the limited potential for compliance cost pass-through (at least 10 of the 21 active domestic producers would experience no impacts), and the operational reality that a substantial quantity (approximately five tons) of phosphogypsum is generated for every ton of phosphoric acid produced using the wet process. Therefore, EPA believes that regulation of phosphogypsum as a hazardous waste could pose a threat to the continued operation of any producer whose phosphogypsum tested EP toxic. Regulation under Subtitle C-Minus would also impose significant impacts at most facilities. The prospect of regulation of phosphogypsum under the Subtitle D-Plus scenario examined here would be unlikely to pose a threat to the continued viability of the majority of the phosphoric acid facilities. For 18 of the 21 active producers, no significant impacts would be incurred in managing phosphogypsum under Subtitle D-Plus regulations. At least three facilities, however, and one in particular, would be expected to incur significant impacts in managing phosphogypsum even under Subtitle D-Plus, potentially posing a threat to the economic viability of these facilities. One of those three facilities, however, is currently planning/constructing a new stack which is expected to be lined and employ a leachate collection system; estimated costs in meeting Subtitle D-Plus requirements may therefore actually have been incurred by that facility while this report was being prepared; in that event, Subtitle D-Plus regulation would not impose any costs or impacts on this facility.

The Agency also expects that regulation of process wastewater as a hazardous waste under both Subtitle C and C-Minus regulation could potentially pose a threat to the economic viability of affected domestic phosphoric acid producers, based on estimated compliance cost impacts; estimated impacts under the Subtitle D-Plus scenario are marginally lower. Because, however, all producers are expected to be affected, there is a greater potential for passing through costs to consumers in the form of higher prices for domestically produced acid than there would be if phosphogypsum were to be regulated as a hazardous waste. Eight of the 21 facilities managing potentially hazardous process wastewaters are predicted to incur significant impacts under the Subtitle D-Plus scenario. The significance of these impacts, as discussed above, is diminished by the possibility of the operators reducing waste generation or physically separating waste streams generated concluded in its analysis of NESHAPs for phosphogypsum stacks that this level of risk is "acceptable."[142] Consequently, EPA promulgated a work practice standard for radon flux from phosphogypsum stacks that the Agency "belives existing stacks meet... without the need for additional control technology."[143]

Likelihood That Existing Risks/Impacts Will Continue in the Absence of Subtitle C Regulation

At many active phosphoric acid production plants, current waste management practices and environmental conditions may allow contaminant releases and risks in the future in the absence of Subtitle C regulation. For example, the stacks and ponds are typically unlined and in the Southeast, where the phosphoric acid industry is most heavily concentrated, and ground water occurs in relatively shallow aquifers. While these surficial aquifers are not typically used for drinking water purposes, they frequently are hydraulically connected to aquifers or surface waters that supply drinking water. Similarly, catastrophic stack and dike failures and long-term seepage from stacks and ponds have released process wastewater and phosphogypsum constituents directly from management units to surface waters. Therefore, environmental releases can occur and, considering the intrinsic hazard of the wastes, significant exposures could occur if contaminated ground water is used as a source of drinking water.

The phosphoric acid production industry recently has been recovering from low production levels in the mid-1980's and may continue to expand somewhat in the future if fertilizer use continues to grow in response to increases in crop prices and planted acreage. Increases in production would likely be provided by increased capacity utilization at active plants (e.g., in 1988 three plants operated at utilization rates of 16 to 38 percent) and the reactivation of plants that are presently on standby. Therefore, if phosphoric acid production does increase, use of existing waste management units (both those at facilities evaluated in this analysis and those at idle facilities that were not included in this analysis) would expand, potentially increasing release potential and posing greater threats to human health and the environment. However, given the large quantities of these wastes, and the ban of off-site use of phosphogypsum,[144] it is unlikely that these wastes will be used or disposed in significant quantities at off-site locations in the future.

State regulation of phosphoric acid production wastes varies considerably among the seven states in which active plants are located, but requirements in most states may not be sufficient to control releases from existing units and prevent threats to human health and the environment. For example, relatively comprehensive solid waste regulations in Louisiana and Florida (under development) require liners and specify closure requirements for new and expansions of existing stacks, but the state programs provide controls for releases from existing units only through requirements for ground-water monitoring and performance standards that in some cases allow off-site contamination. In North Carolina, phosphogypsum and process wastewater are not defined as solid wastes, and are not subject to any solid waste regulations, though discharges from waste management units must be permitted under the state's EPA-approved NPDES program. In summary, state regulatory controls may not be sufficient to prevent releases of phosphogypsum and process wastewater constituents from existing units, and in only a few states are regulations that specify construction and operation standards in place or under development.

Costs and Impacts of Subtitle C Regulation

EPA has evaluated the costs and associated impacts of regulating both phosphogypsum and process wastewater from phosphoric acid production as hazardous wastes under RCRA Subtitle C. EPA's waste characterization data indicate that phosphogypsum exhibited the hazardous waste characteristic of EP toxicity at only one of the eight active facilities for which sampling data were available. EPA's data also indicate that

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142 54 FR 51675, December 15, 1989.

143 Ibid.

144 Ibid.

will now be disposed on-site, regardless of the RCRA requirements that may be applied to such disposal, i.e., regulation under Subtitle C would affect only the costs of phosphogypsum management, not the type(s) of management techniques employed. Direct recycling of phosphogypsum for additional product recovery is not a viable option, and process changes that might affect the chemical properties of the material as well as purification methods have been employed with variable success. It is likely that in response to new regulatory requirements, facility operators would develop and implement measures to render their phosphogypsum non-EP toxic. Process wastewater is currently internally recycled at all active facilities. The potential for reducing the amount of water used and/or significantly reducing the total quantities of corrosive or otherwise hazardous substances currently found in process wastewater is extremely limited, given the nature of wet process phosphoric acid production operations.

90 193

REFERENCE 12

HYDROLOGIC IMPACTS OF PHOSPHATE GYPSUM DISPOSAL AREAS IN CENTRAL FLORIDA

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Salt Lake City, Utah - February 26-March 1, 1990

GURR-90-292

HYDROLOGIC IMPACTS OF PHOSPHATE GYPSUM DISPOSAL AREAS IN CENTRAL FLORIDA

1.0 INTRODUCTION

Large quantities of phosphate rock are mined and processed in Central Florida (Figure 1). The phosphate rock from the mines is further processed in "chemical plants" to produce phosphoric acid (Figure 2). A by-product of the processing of the phosphate rock to produce fertilizer chemicals is an impure form of gypsum referred to as phosphogypsum. For each ton of phosphate rock processed, approximately 1.5 tons of phosphogypsum is produced (Figure 3). The typical method to dispose of this by-product gypsum is to stack it in large piles, locally referred to as gypsum stacks or gypsum fields (Figure 4).

These gypsum stacks have been the focus of many studies in recent years in an attempt to identify the potential for ground water and/or air pollution associated with the stacks. This paper attempts to discuss some of the ground water impacts and current attempts to minimize these impacts.

2.0 BACKGROUND

Initially, phosphate chemical plants produced diamonium superphosphate and waste disposal was minimal. However, since the early 1920's and 1930's when chemical plants first began to clarify and upgrade the P2O5 content of the phosphoric acid to produce triple superphosphate and diamonium phosphate, the quantities of waste gypsum to be disposed increased substantially. During this 30 to 40 year time period, vast quantities have been stored in this manner. At present there are approximately 17 gypsum stacks/fields located in the central Florida phosphate district (Figure 5). These gypsum stacks are not unique to central Florida and are located throughout the United States. Anywhere phosphoric acid is produced, one of these stacks occur. Presently there are gypsum stacks in Louisiana, Mississippi, Missouri, Texas, North Carolina and in many of the western states. A few of these gypsum stacks are inactive, but most are presently being used.

3.0 GENERAL CHARACTERISTICS

As you would expect, most gypsum disposal stacks are located as close as possible or practical to the chemical plant in order to keep pumping costs to a minimum and often are located adjacent to the mining area (Figure 6 and 7). A typical gypsum stack is 400 to 600 acres in size and has an associated cooling water pond of approximately 250 acres in size (Figure 8). The gypsum slurry is transported from the chemical plant to the top of the stack using acidic process water. The gypsum slurry is deposited on the top of the stack, the gypsum settles out and the process water is reused (Figure 9). The process water used to transport the gypsum to the top of the stack is recirculated to the plant generally via the cooling water pond. This process/cooling water is acidic, containing sulfuric and phosphoric acid from the digestion of phosphate rock with sulfuric acid.

In most cases runoff from the side slopes of the stacks is collected in ditches surrounding the perimeter of the stacks.

The process water is returned to the chemical plant for reuse in unlined ditches or pipelines (Figure 10).

Typically once the stack reaches a height of 100 to 150 feet in height, another stack is started in a new location and/or the existing one is expanded (Figures 11 and 12). However, due to difficulties in obtaining permits, some stacks recently are proposed for heights of up to 200 feet (Figure 13).

In the past these plant facilities were generally located in areas away from population centers. However, in recent years, Florida has experienced unprecedented growth and areas which were once remote and removed from population centers are now being surrounded as the suburbs extend out from the cities.

In the late 70's and 80's our environmental awareness has been increased by reported ground-water pollution. The environmental regulatory agencies have focused on gypsum stacks as a potential pollution source. As a consequence of this interest in gypsum stacks, numerous studies have been conducted in the recent past. These studies have been commissioned by various industry and regulatory interest such as the Florida Phosphate Council, Florida Institute of Phosphate Research (FIPR), the Florida Department of Environmental Regulation (FDER), the U.S. Environmental Protection Agency (EPA) and the various operating companies in pursuit of permits for construction or operation of new and existing facilities.

4.0 HYDROLOGIC SETTING IN THE CENTRAL FLORIDA AREA

The upper surficial aquifer and the floridan aquifer are the principal ground water sources in central Florida (Figure 14). In most instances these two aquifers are separated by a confining bed which may have an intermediate aquifer system. Underlying the lower Floridan aquifer is another confining bed. The upper surficial or water table aquifer is principally composed of sand, clayey sands and in some areas shell and gravel beds.

The Floridan aquifer consists principally of porous limestones. The confining units are generally sandy or silty clays, clays and marls; and/or dense limestones and dolomites or dolosilts.

The surficial aquifer is unconfined and rises or falls in response to rainfall and discharges to streams and underlying aquifers. The water level of the surficial aquifer lies below the land surface generally from about 4 to 10 feet in the area of most of the gypsum stacks.

The water in the Floridan aquifer is generally confined. Recharge to the Floridan aquifer is principally by lateral flow, leakage through confining beds and recharge in Karst regions of Florida (Figure 15). Fortunately, most gypsum stacks are located in an area of low recharge to the Floridan aquifer. The general natural flow of ground water in the central Florida phosphate district is southwestward toward the Gulf of Mexico (Figure 16). Since about 1975 the U.S. Geological Survey (USGS) has monitored and mapped the wet and dry season potentiometric level of the

Floridan aquifer. During the winter months agricultural pumpage in south central Florida can reverse the discharge flow (Figure 17).

The sandy surficial sediments which comprise the water table (surficial) aquifer are typically 5 to 50 feet in thickness (Figure 18). These surficial sediments are underlain by 20 to 80 feet of inner-bedded phosphatic, sandy, shelly, clayey, marley sediments that comprise the Pliocene Bone Valley formation. The Miocene Age Hawthorn Formation underlies the Bone Valley Formation. The Hawthorn is an impure marine dolomitic limestone which contains varying concentrations of phosphate and quartz sands, clay, marl and dolomite and ranges in thickness to upwards of 100 feet. In many areas the lower portion is an intermediate aquifer producing zone. Underlying the Hawthorn is the Miocene Tampa Formation. The Tampa is similar to the Hawthorn but contains less dolomite and has more clay beds. The Tampa ranges from a few feet in thicknesses to upwards of a 100 feet thick. Portions of the upper Tampa and lower Hawthorn formations are the principal intermediate aquifer systems. Underlying the Tampa is a thick sequence of Oligocene to Eocene aged limestones. These limestones are hundreds of feet in thickness and comprise the principal Floridan aquifer. Granular evaporites generally underlie the Floridan aquifer.

5.0 RESULTS OF PREVIOUS STUDIES

The most widely published and easily available studies for review are those which were conducted by the USGS beginning in late 1978 and published in 1984. The data were initially published in 1982 and the evaluation of the data being made available approximately 2 years later. As a result of monitoring the ground water around these stacks, FDER has noted ground water violations at many sites as noted in Table 1 and Figure 19.

Recently the USEPA has distributed a Preliminary Draft EIS Supplement to the Central Florida Phosphate area wide EIS. This preliminary draft EIS addresses gypsum disposal systems.

Most studies including the USEPA Draft EIS have indicated that the surficial ground water impacts are generally restrained to an area within 500 to 1500 feet of the gypsum stack (Figures 20, 21 and Table 2). In some cases the intermediate aquifer has been slightly impacted.

6.0 WATER CHARACTERISTICS

The processed water from the chemical plants which is used to slurry the gypsum to the disposal area is highly acidic (ph of 1.4 to 1.8) and has a high dissolved-solids concentration at about 28,000 parts per million (ppm). The predominant contaminants are sodium, phosphate, fluosilicates, hydrogen and sulfate (Table 3).

Native ground water has a dissolved-solids concentration of approximately 500 parts per million with a ph which is generally less than 7.0.

Migration of radionuclides, fluosilicates, phosphates and trace metals are easily percipitated as the acid is neutralized by the carbonate in aquifer fabrics.

Recent monitoring data for some operating plants indicates the chemical front is slowly creeping out from the field as the "carrying or absorptive properties" of the aquifer fabric is reached. As a result of the increasing chemical fronts, regulatory agency personnel are putting increasing pressure on the operators to contain/prevent the leaking of process water from the gypsum stacks.

7.0 APPROACHES TO DEAL WITH THE POTENTIAL FOR GROUND WATER CONTAMINATION IN GYPSUM DISPOSAL FIELDS

In the past, the gypsum disposal fields were constructed either on natural unmined land or in many cases they were constructed directly in the mined lands associated with the phosphate mining process. This meant that the gypsum was deposited directly upon the existing land surface or on the top of the Hawthorn Formation (Figure 22). However, during the past 10 to 15 years, several approaches have been taken to locate the stacks in areas which would alleviate the potential for ground water contamination or to construct the stacks in such a way as to reduce or eliminate the potential for ground water contamination. Initially, to protect the surface water ditches were dug around the stacks to collect the runoff and seepage from the side slopes of the stacks. This was effective to collect the surface water runoff from the gypsum disposal areas.

In the early 80's attempts were made to site stacks in areas where naturally occurring thick clays could be used as a natural liner (Figure 23). In some areas of the central Florida district, the Hawthorn Formation is very impermeable and is quite thick. In the early 80's USS Agri-Chemicals used a modification of this approach in an area where the Hawthorn was very impermeable and waste clays existed (Figure 24). In addition, a ditch was dug around the stack to prevent lateral migration of leachate (Figure 25). However the water level in the ditch had to be carefully controlled to prevent migration of contaminated ground water from the stack into the surrounding surficial aquifer.

In the mid 80's Gardinier proposed an extensive system consisting of a compacted clay liner and underdrains overlying a thick sequence (15-20') of naturally occurring Hawthorn clays in their permit application for a new gypsum stack. This was a very elaborate system of underdrains, liners, slurry walls, etc.

(Figures 26, 27 and 28). Due to the Gardinier Chemical Plant's location on the Tampa Bay and proximity to nearby population centers, these measures were required to insure that the stack would be permitted and that the ground water would be protected. More recently, IMC Fertilizer (IMCF) has proposed to construct a new gypsum disposal stack. Initially IMCF proposed more conventional stack construction techniques where the stack would be built directly upon the Havthorn formation in a mined out area. Recently, due to increasing pressure from the regulatory agencies they have revised their plans and proposed to install a synthetic liner beneath the stack and a slurry cutoff wall along portions of the cooling water pond (Figures 29, 30 and 31). The FDER is presently considering that all new gypsum stacks constructed in Florida will require a liner to protect the ground water.

8.0 SUMMARY

In summary, recent studies have indicated that there are some potential ground water impacts associated with phosphogypsum disposal areas in Florida. Most of these studies have indicated that the lateral ground water impacts to the surficial aquifer system extend beyond the existing non-lined gypsum disposal stacks for a distance of approximately 1500 feet. In some cases contamination has been reported in the intermediate aquifer system. The various regulatory agencies including USEPA, FDER and various state and local governments have continued to increase the pressure for permit applicants to design gypsum stacks which will protect the groundwaters of the state. In the past ten (10) years gypsum stacks have been designed and sited so as to use the natural confining layers and buffering sediments which occur in Florida; designed artificial compacted clay liners and slurry walls; and more recently recommended synthetic membranes overlying the natural confining carbonate sediments to mitigate and control the leachate from gypsum disposal systems. The proposed phosphate area wide draft EIS is proposing even more stringent conditions upon siting of gypsum disposal fields and recommending closure procedures for existing stacks. The results of ground water monitoring for these newly proposed stacks once constructed will be used to determine the next generation of controls and constraints which will be applied to gypsum stack permit conditions.

TMG\GYPSUM.PPR

TABLE 1
REGULATORY STATUS OF PHOSPHOGYPSUM STACKS

FACILITY NAME	ACTIVE	INACTIVE	INTERMEDIATE OR FLORIDAN AQUIFER		SURFICIAL AQUIFER		ENFORCEMENT ACTION INITIATED	POTABLE WELLS WITHIN 1/2 MILE	EXPANSION PERMIT APPLICATION		EXTENDED ZONE OF DISCHARGE
			PRIMARY AND SECONDARY VIOLATION	SECONDARY VIOLATIONS ONLY	PRIMARY AND SECONDARY VIOLATION	SECONDARY VIOLATIONS ONLY			ISSUED	WITHDRAWN	
C.F. INDUSTRIES	X				X		X				
CENTRAL PHOSPHATES	X		X		X		X	X		X	
CONSERVE	X				X		X	X			
FARMLAND INDUSTRIES	X				X		X	X			
GARDINIER	X						X				
AGRICO CHEMICAL	X				X		X				X
AMERICAN CYNAMID		X			X						
IMC NEW WALES	X		X								
ROYSTER, PINEY POINT	X				X						
SEMINOLE FERTILIZER	X		X		X		X	X			
USSAC, BARTOW		X			X			X			
USSAC, FORT MEADE	X					X		X			
ESTECH		X			X						
IMC P-21		X				X					
ROYSTER, MULBERRY	X					X			X		

SOURCE: USEPA DRAFT CENTRAL FLORIDA PHOSPHATE AREA WIDE EIS SUPPLEMENT.

DRWG: CFRP9CHT

TABLE 2

DRINKING WATER STANDARDS: DISTANCE TO EXCEEDANCE OF LIMITATION

Constituent	Drinking Water Standards	Limitation mg/l	Approximate Exceedance Distance			
			Royster	WR Grace	Conserv	USSAC
Silver (Ag)	Primary	0.05	50[a]	100[a]	80[a]	50[a]
Arsenic (As)	Primary	0.05	200[f]	300[f]	500[b]	800[c]
Chromium (Cr)	Primary	0.05	300[b]	600[e]	1200[b]	400[f]
Cadmium (Cd)	Primary	0.01	200[f]	600[e]	850[b]	1050[c]
Lead (Pb)	Primary	0.05	50[a]	100[a]	300[e]	50[a]
Fluoride (F)	Primary	1.6	50[a]	100[a]	80[a]	---
Selenium (Se)	Primary	0.01	50[a]	100[a]	80[a]	50[a]
Iron (Fe)	Secondary	0.3	1000[f]	600[d]	580[d]	1800[e]
Sulfate (SO_4)	Secondary	250	800[f]	600[d]	580[d]	1800[e]
Total Dissolved Solid (TDS)	Secondary	500	1000[f]	600[d]	580[d]	1800[e]
Manganese (Mn)	Secondary	0.05	1100[e]	600[d]	580[d]	1800[e]

[a]Concentration below DWS within given distance

[b]Distance determined by applying linear regression to all downgradient wells

[c]Distance determined by applying linear interpolation between downgradient wells

[d]Elevated concentration above DWS at most distant monitoring well

[e]Concentration slightly above DWS and probably exceeds beyond given distance

[f]Distance estimated using water quality data and distribution of monitoring wells

---Insufficient data

Source: USEPA Draft Phosphate Areawide EIS Supplement

TABLE- 3

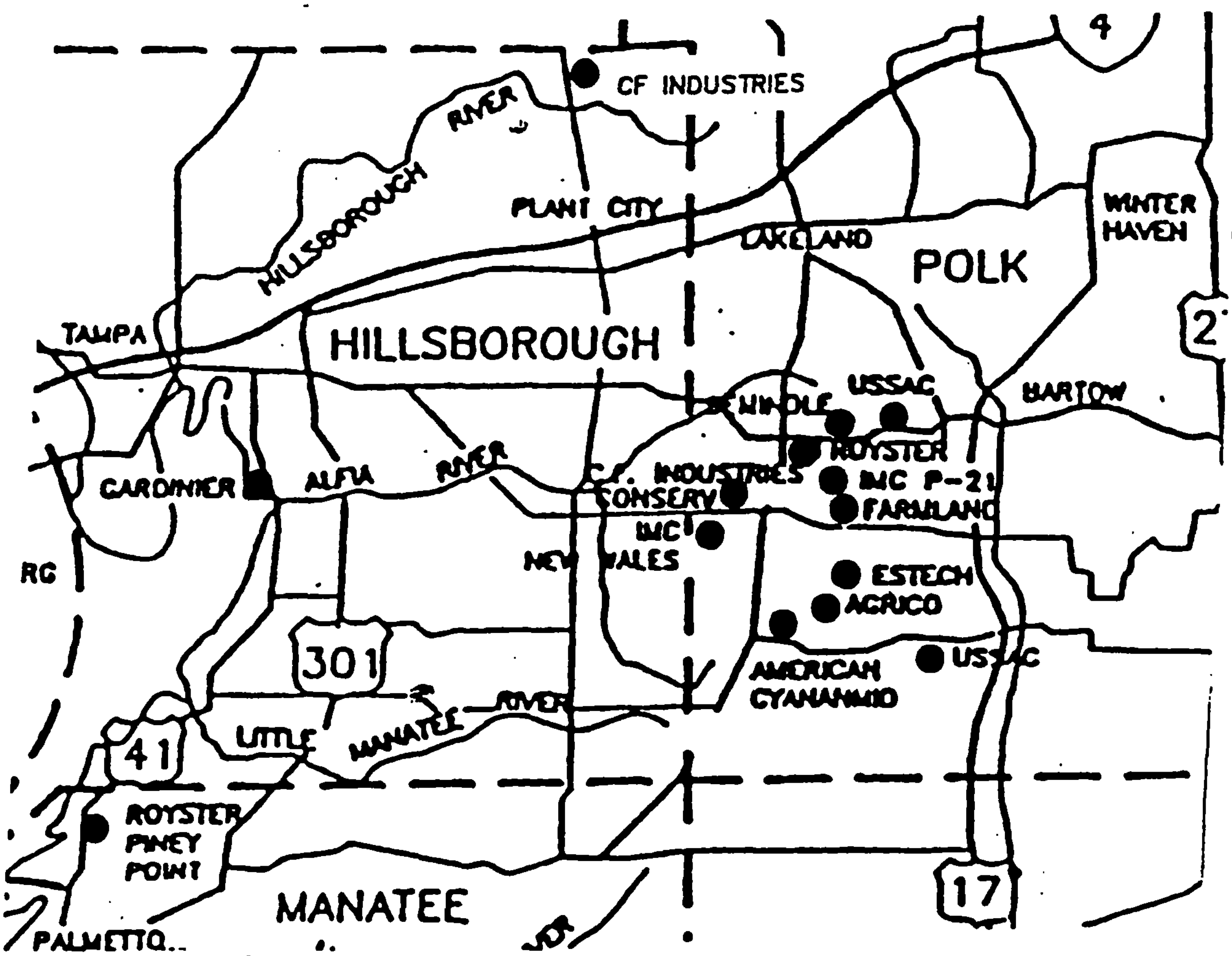
CHEMICAL AND RADIOLOGICAL COMPOSITION OF TYPICAL PHOSPHATE CHEMICAL PLANT POND WATER

	MCL	Pond Water	
• MISCELLANEOUS PARAMETERS			
Sampling Date		04-03-87	09-18-87
pH	>6.5	1.4	1.6
Specific Conductance, µmhos/cm	ns	26,700	32,000
Color, cobalt units	15	1,000	x
Odor, TON	3	40	x
Turbidity, NTU	1	29.5	x
Corrosivity, Langelier Index	-0.2 to +0.2	-7.6	x
Surfactant, mg/l LAS	0.5	<0.05	x
Acidity, as $CaCO_3$	ns	40,000	38,650
Total Hardness, as $CaCO_3$	ns	3,622	x
• MAJOR CONSTITUENTS (mg/l)			
Total Dissolved Solids	500	38,350	43,293
Sulfate, SO_4	250	5,728	4,216
Fluoride, F	4.0	9,400	9,000
Orthophosphate, PO_4 as P	ns	6,500	6,900
Chloride, Cl	250	118	159
Iodide, I	ns	18.8	x
Sulfide, S	ns	0.08	x
Nitrogen			
Nitrate, NO_3 as N	10.0	<0.10	x
Organic, as N	ns	77	x
Ammonia, NH_4 as N	ns	1,421	1,108
Calcium, Ca	ns	1,248	1,076
Magnesium, Mg	ns	279	300
Potassium, K	ns	292	271
Sodium, Na	160	2,020	2,210
Silica, SiO_2	ns	4,452	5,318
• TRACE METALS (mg/l)			
Aluminum, Al	ns	228	273
Antimony, Sb	ns	1.56	x
Arsenic, As	0.05	0.12	0.33
Barium, Ba	1.0	0.6	x
Beryllium, Be	ns	0.10	x
Cadmium, Cd	0.010	0.41	x
Copper, Cu	1.0	0.28	x
Chromium, Cr	0.05	1.52	x
Cyanide, CN	ns	<0.005	x
Iron, Fe	0.3	190.3	252
Lead, Pb	0.05	0.15	x
Manganese, Mn	0.05	11.4	x
Mercury, Hg	0.002	<0.0002	x
Nickel, Ni	ns	1.40	x
Selenium, Se	0.01	0.006	x
Silver, Ag	0.05	0.06	0.06
Thallium, Tl	ns	0.63	x
Zinc, Zn	5.0	4.79	x
• ORGANIC COMPOUNDS (mg/l)			
Total Organic Carbon, TOC	ns	200	x
Phenol	ns	0.16	x
Total Trihalomethane, TTHM	0.10	<0.004	x
• RADIONUCLIDES (pCi/l)			
Gross Alpha Particle Activity	15	2,582±568	x
Radium 226	5(Combined)	67.9±10.2	x
Radium 228		2.1±0.3	x

x: Parameter not measured.
ns: Not specified.
MCL: Section 17-22.210 and 17-22.220 FAC Maximum Contaminant Level.

FIGURE 5

LOCATION OF CHEMICAL PLANTS AND GYPSUM STACKS IN THE CENTRAL FLORIDA PHOSPHATE DISTRICT

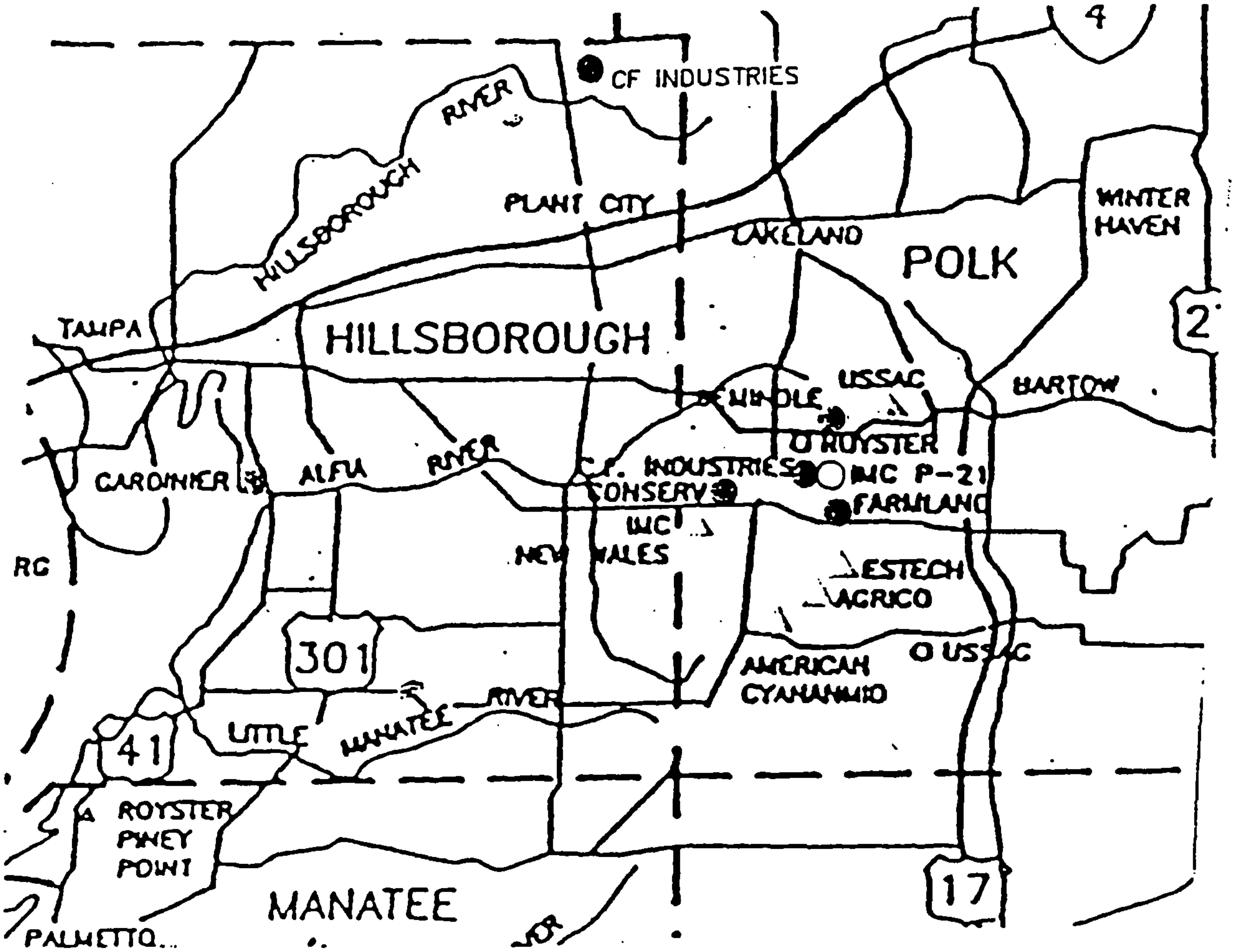


● FACILITY LOCATION

DRWG: CFRPBLCP

FIGURE 19

REGULATORY STATUS OF GYPSUM STACKS IN CENTRAL FLORIDA PHOSPHATE DISTRICT



○ NO CURRENT GROUNDWATER VIOLATIONS

PRIMARY STANDARD VIOLATIONS AT THE PROPERTY BOUNDARY OR IN THE INTERMEDIATE/ FLORIDAN AQUIFER

UNDER INFORCEMENT FOR GROUNDWATER OR SURFACE WATER VIOLATIONS

DRWG: CFRP9RSC

REFERENCE 13

KIRK-OTHMER

ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY

THIRD EDITION

VOLUME 17

PEROXIDES AND PEROXY COMPOUNDS, INORGANIC
TO
PIPING SYSTEMS

1807 YEARS OF PUBLISHING 1982

A WILEY-INTERSCIENCE PUBLICATION
John Wiley & Sons
NEW YORK • CHICHESTER • BRISBANE • TORONTO • SINGAPORE

direct methods of flame spectroscopy are used for low concentrations of phosphorus. Fluorometry, spark-source mass spectroscopy, infrared spectroscopy, electron spectroscopy, and nuclear magnetic resonance spectroscopy have also been employed (see Analytical methods).

Environmental Considerations

Inorganic phosphates present no hazard to humans and are essential to life processes. However, phosphorus creates environmental problems, mainly because its availability increases the growth of algae in many lakes. In recent years, considerable controversy has centered upon the contribution of phosphate-built detergents to excessive algae growth and subsequent eutrophication of natural receiving waters. Minnesota, Wisconsin, Michigan, Indiana, New York, Vermont, and Akron, Ohio, Chicago, Ill., and Dade Co., Fla., have legislated against the use of phosphorus in detergents, resulting in a patchwork of restrictions. No two sets of regulations are exactly alike: some restrict only home laundry detergents, others cover a range of household and commercial cleaning products.

Problems apparently caused by sewage-borne phosphates are mostly localized to areas that have traditionally employed lakes as receiving waters for sewage effluents. Average phosphorus concentrations vary in municipal sewage for several reasons, including industrial waste input, storm waters, seasonal fluctuations, and daily living-habit cycles. Extreme values range between 3 and 15 mg/L (typical 5–9). The chemical form of phosphorus in waste varies, including soluble orthophosphates, condensed phosphates, insoluble salts, and numerous forms of organic phosphorus. Activated-sludge treatment considerably reduces the condensed phosphates to orthophosphates. Thus, the principal inorganic phosphorus input to receiving waters via sewage effluent is orthophosphate. It is believed that much of this is precipitated as inactive phosphorus, which is trapped in sediments where it is ultimately converted to an apatite.

The growth of algal nuisance blooms is complex and appears to involve a symbiotic relationship between algae and bacteria. Sewage effluent, treated or raw, provides an excellent growth medium for both organisms. There is little doubt that phosphorus is one of the nutrients supplied. It is open to question, however, as to whether a banning of phosphate detergents and cleaners sufficiently reduces phosphorus input to the very low levels needed to control algal growth when, in fact, natural wastes and fertilizers provide most of the phosphorus input to receiving waters. A more logical, but more costly, approach is phosphorus removal during sewage treatment.

Investigation of the effects of phosphorus on the environment is in its initial stage; the issue is further complicated by the lack of an adequate data base. Mankind cannot prohibit phosphorus, as it is an essential part of the natural order of the world. However, it has to be controlled when necessary. The simplistic approach of legislating detergent phosphates, although helpful in some isolated cases, does not accomplish this goal. An excellent review of this area is available (10).

BIBLIOGRAPHY

"Phosphoric Acids and Phosphates" in *ECT* 1st ed., Vol. 10, pp. 403–441, by John R. Van Wazer, Monsanto Chemical Company; *ECT* 2nd ed., Vol. 15, pp. 234–276, by John R. Van Wazer, Monsanto Company.

STATE OF FLOF

REFERENCE 14

DEPARTMENT OF ENVIRONM...

SOUTHWEST DISTRICT

PERMITTEE:

Mr. John G. Cladakis
Senior Vice President
CONSOLIDATED MINERALS, INC.
Post Office Box 908
Palmetto, FL 33561

PERMIT/CERTIFICATION

ID Number: 4041P20001
Permit No.: IO41-129068
Expiration Date: May 11, 1990
County: Manatee
Latitude: 27° 37' 24"
Longitude: 82° 31' 54"
Project: Phosphatic Fertilizer Plant Wastewater Treatment and Discharge

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rules 17-3, 17-4 & 17-6. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the department and made a part hereof and specifically described as follows:

The facility consists of phosphoric acid, sulfuric acid and diammonium phosphate plants. Calcium sulfate, which is generated as a by-product in the phosphoric acid production process, is stored at the site. The calcium sulfate transport water and scrubber water from the phosphoric acid and diammonium phosphate plants make up the process wastewater. This stream is ponded and, to the extent possible, reused. Contaminated non-process wastewater is discharged through Outfalls 001 and 002 and the process water which cannot be recycled is treated and discharged through Outfall 003. Process wastewater treatment consists of double-liming and further steps for which confidentiality has been claimed in accordance with Section 403.111, Florida Statutes. Outfalls 001 and 003 discharge to Buckeye Road drainage ditch, which becomes confluent with a southerly flowing railroad drainage ditch, which ultimately discharges into Bishop Harbor, which flows into Tampa Bay. Outfall 002 discharges to a drainage ditch and thence to Piney Point Creek, which empties into Tampa Bay. The groundwater monitoring requirements of Section 17-4.245 of the Florida Administrative Code (F.A.C.) are addressed in this permit.

Location: Immediately east of U.S. Highway 41 and approximately six (6) miles north of Palmetto, Manatee County, Florida.

Replaces Permit No.: IT41-85866B

When the Order (Permit) is final, any party to the Order has the right to seek judicial review of the Order pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date the Final Order is filed with the Clerk of the Department.

Executed in Tampa, Florida.

Sincerely,

Henry B Dominick

Henry B. Dominick
Permitting Engineer
Industrial Waste Program

HBD/aa
Attachment: As stated

cc: W. L. Priesmeyer, MCHD
Southwest District Groundwater

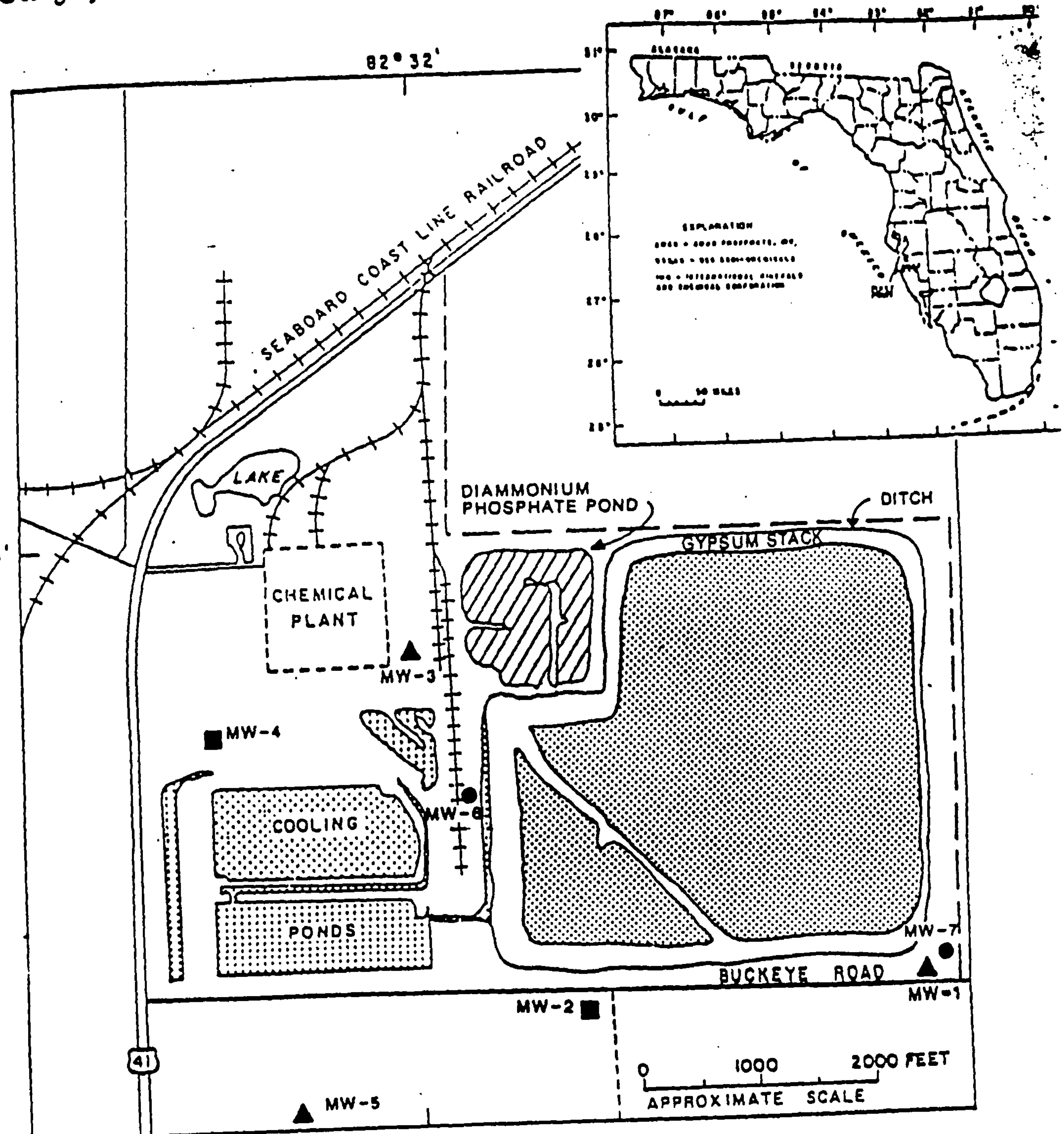
CERTIFICATE OF SERVICE

This is to certify that this NOTICE OF PERMIT and all copies were mailed before the close of business on May 15, 1987 to the listed persons.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to Section 120.52(10), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Angela L. Andrey 05/15/87
Clerk Date

Geraghty & Miller, Inc.



EXPLANATION

MW-1 ▲ NEWLY INSTALLED SURFICIAL AQUIFER MONITOR-WELL LOCATION AND NUMBER

MW-2 ■ EXISTING SURFICIAL AQUIFER MONITOR-WELL LOCATION AND NUMBER

MW-7 ● EXISTING INTERMEDIATE AQUIFER MONITOR-WELL LOCATION AND NUMBER

AMAX CHEMIC
A SUBSIDIARY OF AMA
P.O. BOX 908 • PALMETTO, FLORIDA

REFERENCE 15

987

SOUTH WEST DISTRICT
TAMPA

February 25, 1987

3/3

Dan —
We will soon have to send our Comm to Tally
Full
RG
Sa
3/10

Mr. Dale Twachtmann
Secretary
Florida Department of
Environmental Regulation
Twin Towers Building
2600 Blair Stone Road
Tallahassee, FL 32301

RE: Request for Conductivity Variance
AMAX Chemical Corporation, Piney Point Complex
Industrial Wastewater Permit

Dear Mr. Twachtmann:

AMAX Chemical Corporation is currently operating its industrial wastewater system under temporary operating permit number IT41-85866 B which expires March 4, 1987. Application for an operating permit was filed on January 2, 1987. Included in the existing permit is a variance for specific conductivity, granted for Outfall 003 under DER File No. VE-41-181 which expires April 25, 1987. AMAX Chemical Corporation is hereby applying for a renewal for Specific Conductivity at Outfall 003.

AMAX's Piney Point Complex is located in the northwest section of Manatee County, approximately one-quarter mile inland from Tampa Bay. The Complex has three surface water outfalls; two are non-process discharges (001 and 002) and the third (003) discharges treated process water. One non-process outfall (002) flows northward into Cockroach Bay, a saltwater estuary, while the other non-process outfall (001) and the treated process water outfall (003) flow southward into the marine waters of Bishop Harbor.

The receiving water for the south surface outfalls (001 and 003) is a man-made roadside drainage ditch that flows initially westward for approximately 600 meters below the AMAX outfalls and turns south in a railroad drainage ditch for approximately 1900 meters where it enters Bishop Harbor. This salt water body is typical of Florida marine waters and has conductivity values well in excess of AMAX's effluent.

AMAX requests that the Department grant a variance from the requirements of 17-3.06(2)(o), Florida Administrative Code and 403.201, Florida Statutes, to allow the discharge of water with higher conductivity than allowed by the Water Quality Standards established for Class III waters of the State. Paragraph 17-3.061(2)(o) F.A.C. states: "Specific Conductance -- shall not be increased more than 100% above background levels or to a maximum level of 500 micromhos per centimeter in surface waters in which the specific conductance of the water at the surface is less than 500 micromhos per centimeter; and shall not be increased more than 50% above background level or to a maximum level of 5,000 micromhos per centimeter in surface waters in which the specific conductance of the water at the surface is equal to or greater than 500 micromhos per centimeter but less than 5,000 micromhos per centimeter."

The background specific conductance of the receiving water, based on an average of maximum values over the past eleven (11) months, is 1,468 micromhos per centimeter. The specific conductance of the treated process water discharge is approximately 4,400 (average) and 5,500 (maximum) micromhos per centimeter.

Approximately 2,500 meters downstream the receiving body mixes with the salt waters of Bishop Harbor. Although we have not performed recent studies on conductivity values in Bishop Harbor, it is a well known fact that salt water values are considerably higher than found in the AMAX discharge waters. Work carried out by the company in 1983 and 1984 found that specific conductance values in Bishop Harbor varied between 10,000 and 40,000 micromhos per centimeter approximately 2,500 meters downstream from the AMAX discharge. It is not believed that AMAX's discharge will significantly affect the naturally occurring high specific conductance values in Bishop Harbor. AMAX employs double-lime treatment and an ammonia removal process prior to discharging treated process water. There appears to be no economical method for further reducing the specific conductance of the treated process water effluent.

Anticipating additional questions AMAX offers the following 403.201 Florida Statute response:

1. We believe that this variance request is made pursuant to Chapter 403.201(1)(a) and (c). There is no practicable means known or available for adequate control of the pollution involved. As important, however, even if such means existed, is the fact that it would be impractical from both economic and environmental standpoints to reduce the specific conductance in the discharge to within allowable limits in the receiving body of water because within 2,500 meters, it enters Bishop Harbor where specific conductance values range from 10,000 to 40,000 micromhos per centimeter. The effluent flow route is described above. Thus, even if practicable water treatment technology becomes available to reduce the specific conductance of the effluent, no environmental improvement would result from the company installing such treatment technology.

   AMAX investigated water treatment alternatives to reduce the levels of conductivity in the treated process water discharge in 1984 which included ion-exchange, reverse osmosis, dilution and other treatment technologies. None of the technologies available could be practically applied. Additionally, current inquiries have revealed no breakthrough techniques. AMAX believes that this explanation supports the applicability of sub-paragraphs (a) and (c).

2. AMAX requests a long term variance (at least life of permit) supported by the following.

   a. This ditch/canal system used to transport the effluent from the NPDES outfalls to Bishop Harbor is not a natural system containing high levels of habitat diversity. These waterways were built to drain Buckeye Road, U.S. Highway 41, a railroad line, and agricultural fields used for pasture, sod growing, tomatoes, ornamentals and citrus. Flow upstream of AMAX's outfalls contains elevated levels of conductivity when irrigation runoff or rainfall triggers a flow event.

   b. No adverse effects will result in the Bishop Harbor ecosystem as a result of AMAX's effluent as it already contains naturally occurring elevated levels of specific conductance.

c. Current technology to reduce specific conductance levels in the effluent is not practicable. Even if such technology becomes available, the need to reduce specific conductance levels is not appropriate because AMAX's effluent contains insignificant levels when compared to water in Bishop Harbor.

3. What level of specific conductance can be met in the treated process water discharge?

Untreated process water has conductivity values of approximately 9,000 micromhos per centimeter. Double-lime treated process water typically contains less than 6,000 micromhos per centimeter. AMAX's experience utilizing its proprietary tertiary treatment system ranged from 3,700 to 5,500 micromhos per centimeter. During this entire period of data collection the production facilities have been shut down. Allowing for variation during normal operation continues to suggest a level of 6,000 micromhos per centimeter as a reasonable level of specific conductance.

Thus, we believe the variance should be issued authorizing the release of treated process water less than 6,000 micromhos per centimeter.

<u>17-103.100 Response:</u>

a. addressed above

b. addressed above

c. addressed above

d. addressed above

e. addressed above

f. and g. require a discussion of the social, economic and environmental impacts on the company, residents of the area and of the state if the variance is granted or if the variance is denied. The following addresses these issues:

<u>Social Impacts:</u> The ditch/canal system functions principally to drain land in support of agricultural, transportation, and manufacturing activities. Fishing and other recreational uses have not been observed by AMAX in the ditch system because most residents choose to do so either in larger freshwater streams where flow is continuous or in Bishop Harbor where no environmental impacts will be caused by issuance of the variance. Thus, AMAX cannot identify any significant social impacts upon area residents or the state caused by issuance of the variance.

Denial of the variance also would have limited potential impacts upon residents of the area and the state. As described above, denial of the variance would not result in an ecosystem capable of supporting commercial or recreational uses of the ditch/canal system which are not present currently. Because Bishop Harbor will not be impacted by Department action upon AMAX's request, denial of the variance would have no favorable social consequences upon residents of the area or the state.

<u>Economic Impacts:</u> The principle impact of the Department's decision is economic. Due to the environmental characteristics of the ditch/canal system and Bishop Harbor, a requirement to soften the effluent (should the variance be denied) will impose an unnecessary, multi-million dollar hardship on a facility that has not produced for economic reasons since January, 1985. Denial of the variance will not create an ecosystem capable of generating economic gains to offset AMAX's hardship.

<u>Environmental Impacts:</u> AMAX believes denial of the variance, independent of the question of available treatment technology, would not produce significant environmental benefits because the receiving ditch/canal system is man-made, intermittent, of low ecological diversity, and contains elevated conductivity values due to upstream activities as well as tidal effects in the ditch/canal.

Once AMAX's effluent reaches Bishop Harbor, approximately 2,500 meters downstream of AMAX's NPDES outfalls, no environmental benefits would accrue from denial of the variance because the marine waters of Bishop Harbor contain specific conductance levels far greater than AMAX's effluent. Thus, the environmental benefits of denial are limited to the 2,500 meters of ditch/canal system constructed to drain runoff from agricultural lands, highways, and a railroad. It is difficult to identify meaningful environmental benefits in this case.

Issuance of the variance will result in the conductivity of the canal/ditch system to increase somewhat for 2,500 meters of its length, where mixing with water from Bishop Harbor will cause the conductivity levels to rise to 40,000 micromhos per centimeter. Because it is highly unlikely that aquatic organisms in the canal system are not acclimated to marine waters, issuance of the variance should not adversely affect the aquatic diversity.

The probability of any reduction in diversity is also slight because intermittent flow in the system has already prevented the development of a highly diverse natural ecosystem. Equally important is the system's history of receiving agricultural and highway runoff containing elevated levels of conductivity.

Thus, AMAX believes environmental impacts from issuance of the variance will be limited to theoretical discussions which will be unsupportable by field evidence.

We feel the evidence strongly supports the extension of our request for extending, long term, a variance for specific conductance. If you have any questions, please let me know. Your prompt consideration is appreciated.

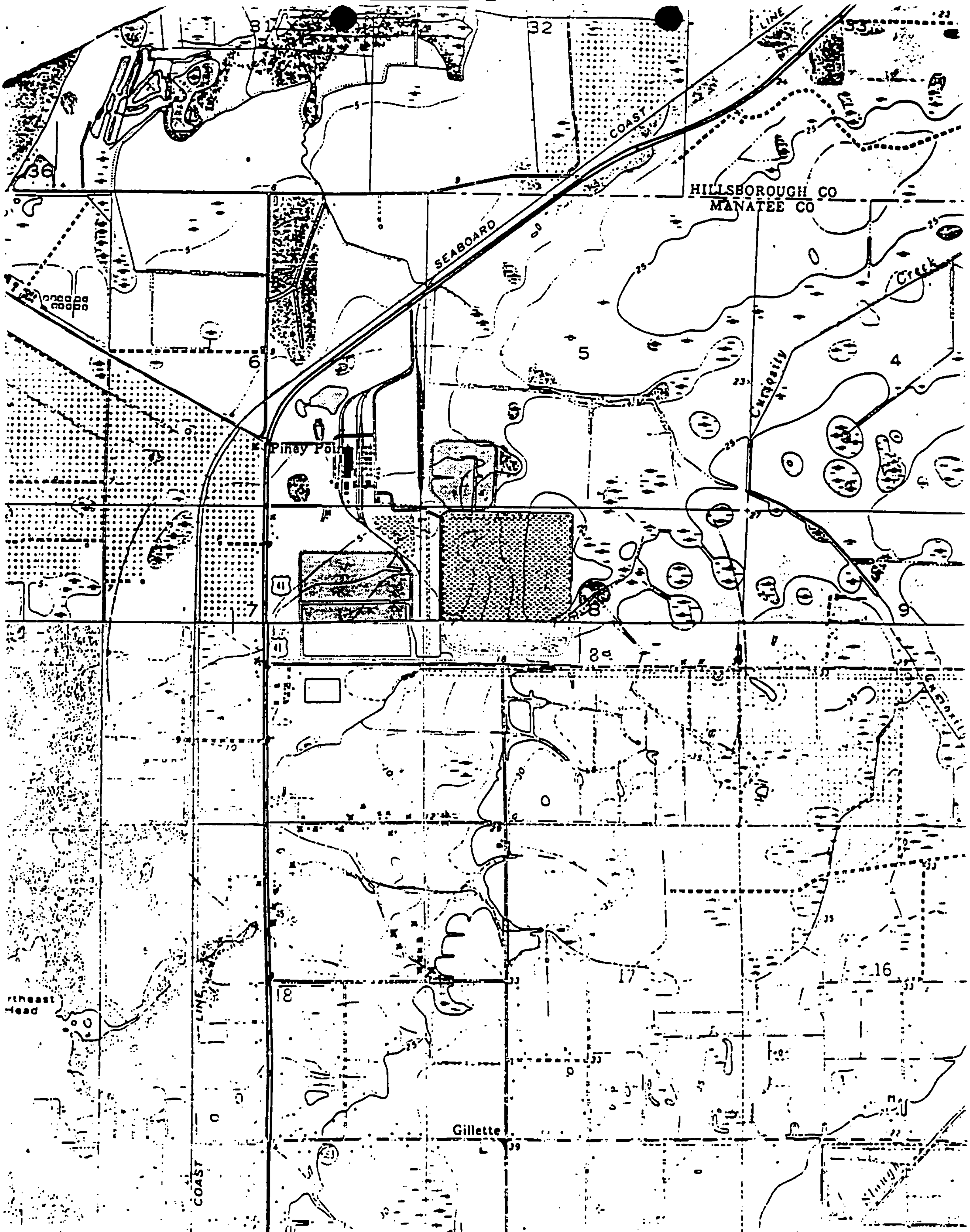
Yours very truly,

John G. Cladakis

John G. Cladakis
Senior Vice President and
Operations Manager

lj

cc: Mr. Peter McGarry, EPA
Mr. William Priesmeyer, Manatee County
Dr. Richard Garrity, D.E.R., Tampa
Mr. Larry Schwartz, D.E.R., Tallahassee
Mr. Bruce V. Galloway, AMAX



X = APPROXIMATE POTABLE WELL LOCATIONS

PART III - INDUSTRIAL [illegible] OCESS

A. General

1. Type of Industry Phosphate Fe [illegible] r
2. SIC Code 2874
3. Raw Materials and Chemicals Used [illegible] ck, [illegible]lfur, Water
   Anhydrous Ammonia
4. Production Rate 2000 tons/day sulfuric acid; 542 tons/day 100% P_2O_5,
   750 tons/day DAP
   tons/day, lbs/day, etc.
5. * Normal Operation 24 hours per day/7 days per week/52 weeks per year
   hrs./day, days/week
6. If operation is seasonal, explain Not Applicable

B. Describe wastewater treatment process and identify treatment units.

003 - The effluent receives two-stage lime treatment for removal of fluorides and phosphates. The alkaline effuent is clarified, ammonia is removed and then acidulated to near neutral pH and discharged.

C. List sludge or slurry treatment units.

(Not applicable)

D. Describe volume, composition and disposal method of sludge. Identify location(s) of ultimate disposal.

The two-stage treatment process generates sludge consisting of calcium fluoride and calcium phosphate. Volume is a function of the need for treatment and discharge of effluent. Sludges are disposed of in the gypsum disposal area.

E. Method(s) and Location(s) of Flow Measurement.

Non-process outfalls 001 and 002, as well as the treated process water outfall 003 have 90 degree v-notch weirs and continuous flow analyzers.

F. Describe practices to be followed to ensure adequate waste treatment during emergencies such as power loss and equipment failures causing shut down of pollution abatement equipment of the proposed/permitted facilities.

Both the two-stage liming process and the acidulation process have malfunction alarms. These alarms are designed to alert plant personnel to malfunctions or failures in the system. Power failure systems will rely on battery backup for power.

G. Laboratory: List tests for which equipment/chemicals are provided, or contract laboratory to perform analysis.

P,F,pH,N, and suspended solids. The parameters are analyzed in accorda with EPA approved methods. When it is necessary to analyze parameters beyond the capability of the on-site laboratory, either a Company lab at another location or a certified commercial laboratory is utilized.

*Due to economic considerations, this facility was shut down in January, 1985 and has not operated since that time. (12/86)

PART V - EFFLUENT DISPOSAL

A. If effluent is discharged to surface waters, complete the following for each discharge point.

1. Immediate receiving body of water (RBW):

   a. Name Buckeye Road Drainage Ditch

   b. Type of receiving water: [X] Fresh [ ] Salt or brackish

   [X] Drainage Ditch
   [ ] Canal
   [ ] Creek
   [ ] River
   [ ] Other (Specify) ______
   [ ] Landlocked Lake
   [ ] Lake with Outfall
   [ ] Tidal Estuary
   [ ] Ocean or Gulf

   c. Classification of receiving water (in accordance with Rule 17-3): Class III

   d. Minimum 7-day 10 year low flow of the RBW at the discharge point (if appropriate): Not Available cfs

   e. Identify and describe the flow of effluent from the point of discharge to a major body of water. A suitably marked map or aerial photograph may be used.

2. Outfall Information: Discharge flows into Buckeye Road Drainage Ditch westward to southerly flowing railroad drainage di

   a. Discharge location: which ultimately discharges into Bishop Harbor which flows into Tampa Bay.

   Latitude 27 ° 37 ' 24 "N Longitude 82 ° 31 ' 54 "W

   b. Design configuration and construction materials:

   Effluent discharges from an underground concrete pipe into rectangular concrete spillway equipped with a 90° V-notch weir.

   c. Distance from shore: Not Applicable

   d. Diameter: 90 Degree V-Notch Weir

   e. Elevation of discharge invert: Not Applicable MSL

   f. Receiving water bottom depth at point of discharge: 2" - 20" (Est) MSL

3. Do you request a mixing zone (refer to Fla. Admin. Code Rule 17-4.244)? If yes, for what parameters or pollutants?

   Current circumstances do not dictate the need for a mixing zone. Should future operations develop the need for a mixing zone, a request will be made at that time.

B. If effluent is discharged to groundwater, complete the following: Not Applicable

1. Disposal method:
   [ ] Slow Rate
   [ ] Rapid Rate
   [ ] Overland Flow
   [ ] Absorption Field
   [ ] Percolation/Evaporation Pond
   [ ] Combination (specify) ______
   [ ] Other (specify) ______

*See attached Copy of USGS Map. Discharge flows west in Buckeye Road drainage ditch to railroad ditch where it flows southward into Bishop Harbor which flows into Tampa Bay.

United States
Department of
Agriculture

Soil
Conservation
Service

In Cooperation with
University of Florida,
Institute of Food and
Agricultural Sciences,
Agricultural Experiment
Stations and Soil Science
Department, and Florida
Department of Agriculture
and Consumer Services

REFERENCE 16

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Florida

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was done prior to November 1952, when the soil survey program was administered by the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration. The first soil survey of Manatee County was issued in December 1958. In 1980, the soils were recorrelated, and data were revised and updated for this soil survey. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service and the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations and Soil Science Department, and the Florida Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the Manatee River Soil and Water Conservation District. The Manatee County Board of Commissioners contributed financially to this soil survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Many of the soils in Manatee County are used for crop production. The main crops are citrus and tomatoes.

contents

soil series

Issued April 1983

these soils have a spodic horizon. EauGallie, Myakka, Wabasso, and Wauchula soils are poorly drained, and Pomello soils are moderately well drained. Cassia, Pomello, and Zolfo soils have a spodic horizon and are sandy to a depth of 80 inches or more.

Typical pedon of Braden fine sand, in woodland, about 2 miles southwest of Lorraine and three-fourths of a mile south of Florida Highway 70, NW1/4SW1/4 sec. 21, T. 35 S., R. 19 E.

A1—0 to 4 inches; very dark gray (10YR 3/1) rubbed fine sand; weak fine granular structure; very friable; common fine roots; very strongly acid; clear smooth boundary.

A21—4 to 6 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; common fine roots; very strongly acid; clear wavy boundary.

A22—6 to 10 inches; brown (10YR 5/3) fine sand; single grained; loose; few fine roots; very strongly acid; clear wavy boundary.

A23—10 to 18 inches; dark brown (10YR 4/3) fine sand; single grained; loose; few fine roots; strongly acid; clear wavy boundary.

A24—18 to 24 inches; light yellowish brown (10YR 6/4) fine sand; common fine faint very pale brown mottles; single grained; loose; very strongly acid; gradual wavy boundary.

B1—24 to 28 inches; yellow (10YR 7/6) fine sand; common fine distinct strong brown (7.5YR 5/6) segregated iron mottles; single grained; loose; very strongly acid; clear wavy boundary.

B21t—28 to 36 inches; yellowish brown (10YR 5/8) fine sandy loam; common fine and medium distinct light gray (10YR 7/1; 7/2) and common fine faint strong brown and yellowish red mottles; weak coarse subangular blocky structure; friable; sand grains bridged and coated with clay; extremely acid; gradual wavy boundary.

B22t—36 to 40 inches; yellowish brown (10YR 5/8) fine sandy loam; many medium distinct light gray (10YR 7/2) and common fine faint strong brown and yellowish red mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; few thin lenses of loamy fine sand; extremely acid; gradual wavy boundary.

B3—40 to 44 inches; very pale brown (10YR 7/4) loamy fine sand; many medium distinct light gray (10YR 7/2) and many fine faint strong brown mottles; moderate medium granular structure; very friable; extremely acid; clear wavy boundary.

C1g—44 to 50 inches; light gray (10YR 7/2) fine sand; few fine distinct brownish yellow (10YR 6/8) mottles; single grained; loose; extremely acid; gradual wavy boundary.

C2g—50 to 55 inches; light brownish gray (10YR 6/2) fine sand; few medium faint light gray (10YR 7/2) mottles; single grained; loose; clear wavy boundary.

C3g—55 to 70 inches; gray (10YR 5/1) sand; many coarse distinct light gray (10YR 7/2) mottles; single grained; loose; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is very strongly acid or strongly acid. The Bt and C horizons range from extremely acid to strongly acid.

The A1, or Ap, horizon has hue of 10YR, value of 2, and chroma of 1 or value of 3 or 4 and chroma of 1 to 3. It is less than 10 inches thick where value is 3 or less and chroma is 2 or 1.

The A21 horizon has hue of 10YR, value of 5 to 7, and chroma of 2. The A22 to A24 horizons have hue of 10YR, value of 5 or 6, and chroma of 3 to 6; or value of 4 and chroma of 3 or 4; or value of 7 and chroma of 3 or 4. In some pedons there are few to common mottles or splotches of uncoated sand grains that have chroma of 2 or 1. The A horizon is sand or fine sand. There is no A21 horizon in some pedons.

The B1 horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 4 to 8. It is sand, fine sand, loamy sand, or loamy fine sand. There is no B1 horizon in some pedons.

The B2t horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8; or hue of 7.5YR, value of 5, and chroma of 4 or 6; or value of 6 and chroma of 4 to 8 and few to many mottles that have chroma of 2 or less. There are mottles of higher value and chroma in many pedons. The horizon is sandy loam, fine sandy loam, or sandy clay loam. In some pedons there are a few streaks or lenses of coarser textured material. The mottles that have chroma of 2 are at a depth of less than 30 inches. They indicate wetness.

In some pedons the lower part of the B2t horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or 1; or hue of 2.5Y, value of 4 to 7, and chroma of 2; or hue of 5Y, value of 5 or 6, and chroma of 1; or it has no hue (N), value is 4 to 7, and in some pedons, there are mottles of red, yellow, brown, or gray. The texture is sandy loam, fine sandy loam, or sandy clay loam.

The B3 horizon has hue, value, and chroma that are similar to those of the B2t horizon. It ranges from fine sandy loam to loamy sand. There is no B3 horizon in some pedons.

The Cg horizon has hue, value, and chroma similar to those of the lower part of the B2t horizon. It is sand or fine sand.

Bradenton series

The Bradenton series consists of poorly drained, moderately permeable soils that formed in unconsolidated loamy marine sediment underlain by marl and, in some places, hard limestone. The soils are nearly level and are on low-lying ridges and hammocks. Slopes are generally smooth and are less than 2 percent. In most years, if the soils are not drained, the water table is

B22tca—24 to 44 inches: very dark gray (10YR 3/1) sandy clay loam: weak coarse subangular blocky structure: friable: sticky and plastic: few fine roots: many soft white calcium carbonate accumulations: sand grains coated and bridged with clay: moderately alkaline. calcareous: gradual wavy boundary.

B23tca—44 to 51 inches: dark gray (10YR 4/1) sandy clay loam: few fine distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/8) mottles: weak coarse subangular blocky structure: friable: sticky and plastic: sand grains coated and bridged with clay: many fine and medium white calcium carbonate accumulations: moderately alkaline. calcareous: gradual wavy boundary.

B3g—51 to 63 inches: gray (10YR 5/1) fine sandy loam: common medium distinct yellowish brown (10YR 5/4) mottles: massive: friable: common calcium carbonate nodules: moderately alkaline. calcareous: gradual wavy boundary.

Cg—63 to 80 inches: gray (10YR 6/1) loamy fine sand and fine sand: massive: very friable: few small calcium carbonate nodules: moderately alkaline. calcareous.

The solum is more than 40 inches thick.

The A horizon has hue of 10YR. value of 2 or 3. and chroma of 1 or 2. Reaction ranges from slightly acid to moderately alkaline. Thickness ranges from 4 to 18 inches.

The B2t and B2tca horizons have no hue (N) or have hue of 10YR: value is 2 through 5. and chroma is 1 or 0: or they have hue of 5YR. value of 4 through 6. and chroma of 1 or 2 and. in some pedons. mottles of gray or brown: or they have hue of 2.5Y. value of 4 or 5. and chroma of 2 and mottles. Texture is sandy loam or sandy clay loam. Clay content in the upper 20 inches of the argillic horizon ranges from 18 to 35 percent. In the Btca horizon. reaction ranges from neutral to moderately alkaline and calcareous.

The B3g horizon has the same color range as the B2t and B2tca horizons. Its texture is sandy loam or fine sand loam. The horizon has pockets or lenses of coarser material in some places.

The Cg horizon has hue of 10YR. value of 5 through 7. and chroma of 1: hue of 2.5Y. value of 5 through 7. and chroma of 2: hue of 5Y. value of 5 through 7. and chroma of 1 or 2: or hue of 5GY. value of 5 or 6. and chroma of 1 and. in some pedons. mottles. Its texture ranges from fine sand or loamy fine sand to clay loam. Reaction ranges from neutral to moderately alkaline and calcareous. There are shell fragments in some pedons.

Chobee Variant

Chobee Variant soils are very poorly drained. slowly permeable soils that formed in thick beds of alkaline loamy marine sediment. These soils are nearly level and are in shallow depressions mainly in the western part of the county. The water table is at a depth of less than 10 inches for 6 months or more of the year. Undrained areas pond for long periods. Slopes range from 0 to 2 percent. These soils are fine-loamy. carbonatic. hyperthermic Typic Haplaquolls.

Chobee Variant soils are near Bradenton. Chobee. Felda. and Manatee soils. Bradenton soils do not have a mollic epipedon and are poorly drained. Chobee soils have an argillic horizon. Felda soils are poorly drained and have an argillic horizon below a depth of 20 inches. Manatee soils have a sandy loam argillic horizon.

Typical profile of Chobee Variant sandy clay loam. in a wooded area. 100 feet east of Cedar Drain and one-half mile south of Atlantic Coast Line Railroad. SE1/4NE1/4 sec. 28. T. 33 S., R. 18 E.

A11—0 to 13 inches: black (10YR 2/1) sandy clay loam. weak medium subangular blocky structure: firm: high in organic matter: few fine and medium roots: neutral: clear wavy boundary.

A12—13 to 20 inches: very dark gray (10YR 3/1) sandy clay loam: weak medium subangular blocky structure: common fine faint very dark grayish brown mottles: firm: few fine and medium roots: neutral: clear wavy boundary.

B2gca—20 to 35 inches: light gray (10YR 7/2) sandy clay loam: common fine distinct dark gray (10YR 4/1) mottles: moderate medium subangular blocky structure: sticky: soft accumulations of calcium carbonate: moderately alkaline. calcareous: clear wavy boundary.

B3gca—35 to 40 inches: light gray sandy loam: common medium distinct yellow (10YR 7/6) mottles: weak fine subangular blocky structure: slightly sticky: soft accumulations of calcium carbonate: moderately alkaline. calcareous: clear wavy boundary.

C1g—40 to 70 inches: light gray (10YR 7/2) loamy sand: weak medium granular structure: few fine shell fragments: very friable: moderately alkaline. calcareous: clear wavy boundary.

C2g—70 to 80 inches: mixed light gray (10YR 7/2) and brownish yellow (10YR 6/6) sand: single grained: loose: common shell fragments: moderately alkaline. calcareous.

The solum ranges from 35 to 60 inches in thickness Base saturation is 50 percent or more in all horizons. The mollic epipedon is 10 to 24 inches thick.

The A horizon has no hue (N) or has hue of 10YR: value is 2 or [illegible] and chroma is [illegible]. Reaction ranges from medium acid to neutral.

The Bgca horizon has no hue (N) or has hue of 10YR: value is 5 to 7, and chroma is 2 to 0. The texture is mainly sandy clay loam or sandy clay but ranges to sandy loam in the lower part. The content of clay in the

10- to 40-inch control section averages 20 to 35 percent. Reaction is mildly alkaline or moderately alkaline. There are few to common mottles in shades of yellow or brown.

The Cg horizon has no hue (N) or has hue of 10YR; value is 5 to 7, and chroma is 2 to 0. The texture is sand or loamy sand. Carbonatic accumulations are common in some pedons. Shell fragments range from few to common.

Delray series

The Delray series consists of very poorly drained soils that formed in marine sandy and loamy material. Permeability is moderate or moderately rapid. The soils are nearly level and are in low shallow depressions. In most years, if the soils are not drained, the water table is at or slightly above the surface for more than 6 months of the year. Slopes are less than 2 percent. These soils are loamy, mixed, hyperthermic Grossarenic Argiaquolls.

Delray soils are near Bradenton, Felda, Floridana, EauGallie, Manatee, Myakka, Ona, Pomona, and Waveland soils. Bradenton soils do not have a mollic epipedon but have an argillic horizon at a depth of less than 20 inches. Felda soils do not have a mollic epipedon but have an argillic horizon at a depth between 20 and 40 inches. Floridana soils have an argillic horizon at a depth between 20 and 40 inches. Manatee soils have an argillic horizon at a depth of less than 20 inches. EauGallie, Myakka, Ona, Pomona, and Waveland soils have a spodic horizon and are better drained than Delray soils.

Typical pedon of Delray mucky loamy fine sand, in a wooded area, about 2.5 miles east of the Sarasota County line and 0.75 mile south of Florida Highway 18, NW1/4NE1/4 sec. 16, T. 37 S., R. 21 E.

A11—0 to 8 inches; black (N 2/0) mucky loamy fine sand; weak medium granular structure; very friable; common fine and medium roots; neutral; gradual smooth boundary.

A12—8 to 16 inches; black (10YR 2/1) loamy fine sand; few fine faint dark gray mottles; weak medium granular structure; very friable; many fine roots; neutral; clear wavy boundary.

A21—16 to 21 inches; grayish brown (10YR 5/2) fine sand; common medium distinct very dark gray (10YR 3/1) streaks and mottles; single grained; loose; common fine and few medium roots; neutral; clear wavy boundary.

A22—21 to 43 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct dark gray (10YR 4/1) mottles and very dark gray (10YR 3/1) streaks along old root channels; single grained; loose; common fine and few medium roots; neutral; clear wavy boundary.

A23—43 to 48 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine roots; neutral; clear wavy boundary.

B21tg—48 to 51 inches; grayish brown (2.5Y 5/2) fine sandy loam; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; few fine roots; mildly alkaline; clear wavy boundary.

B22tg—51 to 66 inches; grayish brown (2.5Y 5/2) sandy clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few clay films on ped surfaces; neutral; gradual wavy boundary.

B23tg—66 to 75 inches; greenish gray (5GY 6/1) sandy clay loam; common medium distinct olive brown (2.5Y 4/4) mottles; moderate medium subangular blocky structure; firm; clay films on ped surfaces; neutral; clear wavy boundary.

B24tg—75 to 80 inches; grayish brown (2.5Y 5/2) sandy clay loam; few fine faint light gray mottles; weak medium subangular blocky structure; firm; few clay films on ped surfaces; common fine sand lenses between peds; neutral.

Reaction ranges from medium acid to neutral in the A horizon and from neutral to mildly alkaline in the Btg horizon.

The A1 horizon has hue of 10YR, value of 3 or less, and chroma of 2 or 1; or it has no hue (N) and value of 2 or 3. The content of organic matter ranges from about 2 to 18 percent. The horizon ranges from 10 to 24 inches in thickness.

The A2 horizon has hue of 10YR or 2.5YR, value of 4 to 7, and chroma of 2; or it has hue of 10YR, value of 4 to 7, and chroma of 1; or it has no hue (N) and value of 4 to 7. The texture is fine sand or sand. The horizon ranges from 27 to 55 inches in thickness.

The B2tg horizon has hue of 10YR to 5GY, value of 4 to 6, and chroma of 1; or hue of 10YR, value of 4 to 6, and chroma of 2; or it has no hue (N), and value is 4 to 6. It has mottles of brown, yellow, or olive in some pedons. Its texture is fine sandy loam or sandy clay loam.

The B3g horizon is similar in color to the B2tg horizon. Its texture is loamy sand or loamy fine sand. There is no B3g horizon in some pedons.

Duette series

The Duette series consists of moderately well drained soils that formed in thick deposits of marine sand. Permeability is moderately rapid. The soils are nearly level to gently sloping and are on low ridges and knolls in flatwoods. In most years, if the soils are not drained, the water table is at a depth of 48 to 72 inches for 1 to 4 months during the wet season. It is at a depth of more than 72 inches for the rest of the year. Slopes range within 10 inches of the surface for 2 to 6 months out of the year and at a depth of 10 to 40 inches for much of the rest of the year. In dry periods the water table recedes to a depth below 40 inches. These soils are coarse-loamy, siliceous, hyperthermic Typic Ochraqualfs.

Bradenton soils are near Chobee, Delray, EauGallie, Felda, Floridana, Manatee, Wabasso, and Waveland soils. Chobee soils are fine-loamy. Delray and Floridana soils have a mollic epipedon and an A horizon that is more than 20 inches thick. EauGallie, Wabasso, and Waveland soils have a spodic horizon. Felda soils have an A horizon that is 20 to 40 inches thick. Manatee soils have a mollic epipedon.

Typical pedon of Bradenton fine sand, in a hardwood-cabbage palm hammock, about one-eighth mile east of the Sarasota County line along the north boundary of the Myakka River State Park, SW1/4NW1/4 sec. 6, T. 37 S., R. 21 E.

A1—0 to 4 inches; dark gray (10YR 4/1) fine sand; moderate medium granular structure; very friable; many fine and medium roots; medium acid; clear smooth boundary.

A2—4 to 9 inches; grayish brown (10YR 5/2) fine sand; few medium distinct dark gray (10YR 4/1) mottles; single grained; loose; many fine and medium roots; medium acid; abrupt wavy boundary.

B21tg—9 to 20 inches; dark gray (10YR 4/1) fine sandy loam; common fine and medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few thin discontinuous clay films on surface of peds; slightly acid; gradual wavy boundary.

B22tg—20 to 27 inches; gray (10YR 5/1) fine sandy loam; many fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few thin discontinuous clay films on surface of peds; common soft white calcium carbonate accumulations; mildly alkaline; gradual wavy boundary.

B3g—27 to 38 inches; gray (10YR 5/1) loamy fine sand; weak coarse subangular blocky structure; very friable; many sand grains coated with white calcium carbonate, few white calcium carbonate nodules; mildly alkaline, calcareous; clear wavy boundary.

C—38 to 80 inches; light gray (10YR 7/1) marl that has texture of loamy fine sand; massive; friable; moderately alkaline, calcareous.

The solum ranges from 20 to 50 inches in thickness.

The A1, or Ap, horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or it has no hue (N) and value of 2 to 4. It ranges from medium acid to neutral and ranges from 4 to 6 inches in thickness.

The A2 horizon has hue of 10YR, value of 4 to 7, and chroma of 1; or value of 5 to 7 and chroma of 2; or it has no hue (N) and value of 4 to 7 and mottles of gray, brown, or yellow. Reaction ranges from medium acid to neutral. The total thickness of the A horizon is less than 20 inches.

The B2tg horizon has hue of 10YR, value of 4 to 7, and chroma of 1; or hue of 10YR or 2.5Y, value of 3 to 7, and chroma of 2; or it has no hue (N) and value of 4 to 7 and, in places, mottles of brown, yellow, or red. The horizon is sandy loam or fine sandy loam, and it ranges from slightly acid to mildly alkaline. In many pedons the lower part of the horizon has soft calcium carbonate accumulations and nodules. The B3g horizon is similar in color to the B2tg horizon. It is loamy sand or loamy fine sand and is mildly alkaline or moderately alkaline. In some places there is no B3g horizon.

The C horizon has hue of 10YR to 5GY, value of 5 to 8, and chroma of 2 or 1. It is predominantly marl that has texture of loamy sand or loamy fine sand. However, in some pedons the C horizon is a mixture of shells, shell fragments, and sand.

In some pedons a layer of limestone about 1.5 to 3 feet thick underlies the Btg, B3g, or C horizons at a depth between 40 and 80 inches. The limestone can be dug with a backhoe. It has few to common solution holes or fractures. Below the limestone there is variable sand to sandy clay loam mixed with shells and shell fragments.

Broward Variant

Broward Variant soils are poorly drained and moderately permeable. They formed in sandy marine sediment overlying limestone. These soils are nearly level and are in moderately large to small areas of flatwoods, mainly in the western part of the county. Slopes are 0 to 2 percent. In most years, if the soils are not drained, the water table is between depths of 10 and 40 inches for more than 6 months of the year. It is at a depth of less than 10 inches for 1 to 4 months in wet seasons and recedes to a depth below 40 inches in very dry seasons. These soils are sandy, siliceous, hyperthermic Entic Haplaquods.

Broward Variant soils are near Chobee, Delray, EauGallie, Myakka, and Wabasso Variant soils. All the associated soils except Wabasso Variant soils do not have limestone within a depth of 80 inches. Chobee and Delray soils have a mollic epipedon, do not have a spodic horizon, and have an argillic horizon. EauGallie soils have an argillic horizon below a depth of 40 inches. Myakka soils have a spodic horizon that is better developed than that of Broward Variant soils. Wabasso Variant soils have an argillic horizon between the spodic horizon and limestone.

Typical pedon of Broward Variant fine sand, in a partly cleared area, about 2 miles west of Oneco and about 1,000 feet north of 53rd Ave., SW1/4SW1/4 sec. 11, T. 35 S., R. 17 E.

from 0 to 5 percent. These soils are sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods.

Duette soils are near Cassia, Myakka, and Pomello soils. Cassia and Myakka soils have a spodic horizon at a depth of less than 30 inches. Cassia soils are somewhat poorly drained, and Myakka soils are poorly drained. Pomello soils have a spodic horizon at a depth between 30 and 50 inches.

Typical pedon of Duette fine sand, 0 to 5 percent slopes, in an area of sand scrub, approximately 2.25 miles east of the northeast corner of the Myakka River State Park, SW1/4SW1/4SW1/4 sec. 3, T. 37 S., R. 21 E.

A1—0 to 4 inches; very dark gray (10YR 3/1) rubbed, salt and pepper appearance unrubbed, fine sand; weak fine granular structure; friable; many fine and medium roots; strongly acid; clear smooth boundary.

A21—4 to 12 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine and coarse roots; slightly acid; clear smooth boundary.

A22—12 to 58 inches; white (10YR 8/1) fine sand; single grained; loose; few fine and coarse roots; slightly acid; clear smooth boundary.

B21h—58 to 64 inches; dark brown (7.5YR 3/2) fine sand; weak medium subangular blocky structure; friable; sand grains well coated with organic matter; few fine roots; strongly acid; clear wavy boundary.

B22h—64 to 80 inches; black (5YR 2/1) fine sand; weak medium subangular blocky structure; friable; many fine and medium roots; strongly acid.

Reaction ranges from slightly acid to strongly acid throughout. Texture is sand or fine sand in all horizons.

The A1 horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. Unrubbed material has a salt and pepper appearance. Thickness ranges from 2 to 6 inches.

The A2 horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. Combined thickness of the A1 and A2 horizons ranges from 51 to 75 inches.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2 or 3, and chroma of 1 to 4

EauGallie series

The EauGallie series consists of poorly drained soils that formed in thick beds of sandy and loamy marine sediment. Permeability is moderate to moderately rapid. The soils are nearly level and are in broad areas of flatwoods and, in some places, in slightly depressed areas. In most years, a water table is at a depth of less than 10 inches for 2 to 4 months in wet seasons and at a depth of less than 40 inches for more than 6 months of the year. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

EauGallie soils are near Delray, Pinellas, and Wabasso soils. Delray soils are very poorly drained, have a mollic epipedon, and do not have a spodic horizon. Pinellas soils do not have a spodic horizon. Wabasso soils have an argillic horizon at a lesser depth.

Typical pedon of EauGallie fine sand, in a pasture, about 2.5 miles west of Foxleigh and 3.25 miles southeast of the Manatee River, SW1/4NE1/4 sec. 26, T. 34 S., R. 18 E.

Ap—0 to 5 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine roots; mixture of light gray sand grains and black organic matter granules; very strongly acid; gradual wavy boundary.

A21—5 to 12 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine roots; very strongly acid; gradual wavy boundary.

A22—12 to 28 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few fine roots; few medium distinct grayish brown (10YR 5/2) mottles; very strongly acid; abrupt wavy boundary.

B2h—28 to 42 inches; black (5YR 2/1) fine sand; massive in place, crushes to moderate medium granular structure; friable sand grains coated with organic matter; few fine roots; very strongly acid; clear wavy boundary.

B2tg—42 to 50 inches; grayish brown (2.5Y 5/2) sandy clay loam; moderate medium subangular blocky structure; firm and slightly sticky; few fine roots; sand grains coated and bridged with clay; slightly acid; gradual wavy boundary.

C—50 to 65 inches; mixed lenses and pockets of grayish brown (10YR 5/2) fine sand, loamy fine sand, and fine sandy loam; massive; friable; few pockets of grayish brown (2.5Y 5/2) sandy clay loam; slightly acid.

The solum is more than 46 inches thick. The A horizon is less than 30 inches thick. The Btg horizon is at a depth of more than 40 inches. The A and Bh horizons are sand or fine sand.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. It ranges from 3 to 9 inches in thickness. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 2 or 1. The A horizon is very strongly or strongly acid.

The B2h horizon has no hue (N) and value of 2; or hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR and 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 3, and chroma of 3. The sand grains are coated with organic matter. Reaction ranges from very strongly acid to slightly acid. The B3 horizon has hue of 10YR, value of 3 to 6, and chroma of 3. It consists of sand or fine sand. It is commonly below the Bh horizon. The A'2 horizon has hue of 10YR, value of 4 or 5, and chroma of 1; or hue of 10YR or 2.5Y, value of

5 or 6, and chroma of 2. There is no A'2 horizon in some pedons.

The B2tg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 1. In some pedons it has mottles in shades of brown, yellow, or gray. Its texture is sandy loam or sandy clay loam. There are pockets of sand or loamy sand. Reaction is medium acid to mildly alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 1. In some pedons it has mottles in shades of yellow or brown. Its texture is fine sand, loamy fine sand, or sandy loam. The horizon has pockets of finer textured material in some pedons. Reaction is slightly acid to mildy alkaline.

Estero series

The Estero series consists of very poorly drained soils that formed in thick deposits of sandy marine sediment under conditions favorable for the accumulation of organic material. Permeability is moderately rapid. These soils are nearly level and are in tidal mangrove swamps. Slopes are less than 1 percent. These soils are flooded daily by high tides. The water table is above the surface or just below the surface, depending on the tide. These soils are sandy, siliceous, hyperthermic Typic Haplaquods.

Estero soils are near Wulfert and Kesson soils in tidal swamps and Myakka, Delray, Bradenton, and St. Johns soils on uplands. Wulfert soils are organic. Kesson soils do not have a spodic horizon. Myakka, Delray, Bradenton, and St. Johns soils do not have a histic epipedon. Delray soils have a mollic epipedon, do not have a spodic horizon, and have an argillic horizon. Bradenton soils do not have a spodic horizon but have an argillic horizon. St. Johns soils have an umbric epipedon.

Typical pedon of Estero muck, in a mangrove swamp, on Perico Island, SW1/4SE1/4 sec. 27, R. 16 E., T. 34 S.

Oa—0 to 6 inches; black (10YR 2/1) muck; about 90 percent fiber, less than 10 percent rubbed; massive; friable; neutral; abrupt smooth boundary.

A11—6 to 11 inches; black (N 2/0) fine sand; weak fine [illegible] moderately alkaline; clear smooth boundary.

A12—11 to 14 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine roots; moderately alkaline; clear wavy boundary.

A21—14 to 20 inches; light brownish gray (10YR 6/2) fine sand; few fine distinct yellowish red (5YR 5/8) mottles; single grained; loose; few fine roots; moderately alkaline; clear wavy boundary.

A22—20 to 31 inches; grayish brown (10YR 5/2) fine sand; few medium distinct yellowish red (5YR 5/6) mottles; single grained; loose; few very fine roots; mildly alkaline; abrupt wavy boundary.

B21h—31 to 41 inches; black (5YR 2/1) and dark grayish brown (10YR 4/2) fine sand; massive; very friable; sand grains thinly coated with organic matter; very strongly acid; clear wavy boundary.

B22h—41 to 46 inches; black (10YR 2/1) and dark reddish brown (5YR 3/2) fine sand; massive; very friable; sand grains thinly coated with organic matter; very strongly acid; gradual wavy boundary.

B3—46 to 56 inches; dark brown (10YR 4/3) and black (10YR 2/1) fine sand; massive; very friable; very strongly acid; clear wavy boundary.

C—56 to 80 inches; grayish brown (10YR 5/2) fine sand; few fine distinct black (10YR 2/1) mottles; single grained; loose; very strongly acid.

Reaction in the Oa and A horizons ranges from neutral to moderately alkaline by field test and from very strongly acid to mildly alkaline after drying. The Bh horizon is strongly acid or very strongly acid. Conductivity of the saturation extract ranges from about 245 to 350 mmho/cm in the Oa horizon and from 15 to 45 mmho/cm in the mineral horizons.

The Oa or Oe horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. In pedons where the Oa or Oe horizon is less than 10 inches thick, there is a histic epipedon if the soil is mixed to a depth of 10 inches.

The A1 horizon has hue of 10YR, value of 2, and chroma of 1; or value of 3 or 4 and chroma of 1 or 2; or hue of 2.5Y, value of 3 or 4, and chroma of 2; or it has no hue (N), and value is 2 to 4. Where value is 3 or less and chroma is 2 or 1, it is less than 10 inches thick even after mixing with the Oa or Oe horizon to a depth of 10 inches. The texture is sand, fine sand, mucky sand, or mucky fine sand.

The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2 and, in some pedons, has brown, yellow, red, or gray mottles and streaks. Its texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1; or value of 3 and chroma of 1 or 2; or hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, [illegible] of 1 to 4. The B21h horizon does not have colors of higher chroma, as described, in all pedons. Texture is sand, fine sand, or loamy fine sand. There are few to common uncoated sand grains in the upper part of the horizon.

The B3 horizon has hue of 10YR, value of 3, and chroma of 3; or value of 4 and chroma of 2 to 4; or hue of 7.5YR and 5YR, value of 4, and chroma of 2 or 4. Its texture is sand or fine sand.

but in places extends throughout the horizon as small bodies of uncemented fine sand. The B&Bh horizon is 18 to 43 inches thick.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 4. It extends to a depth of 80 inches or more.

Palmetto series

The Palmetto series consists of deep, poorly drained soils that formed in thick deposits of sand and loamy marine sediment. Permeability is moderately slow. The soils are nearly level. They are in the flatwoods in sloughs, in poorly defined drainageways, and in depressions. Slopes are less than 2 percent. In most years, if the soils are not drained, the water table is at a depth of 10 inches for 2 to 6 months of the year. In depressions water is ponded for 2 to 6 months of the year. These soils are loamy, siliceous, hyperthermic Grossarenic Paleaquults.

Palmetto soils are near Delray, EauGallie, Wabasso, and Waveland soils. Delray soils have a mollic epipedon and are sandy to a depth of 80 inches or more. EauGallie, Wabasso, and Waveland soils have a spodic horizon. A part of the spodic horizon in Waveland soils is ortstein.

Typical pedon of Palmetto sand, about 2.25 miles north of Verna, SW1/4SW1/4 sec. 24, T. 35 S., R. 20 E.

A11—0 to 8 inches; black (10YR 2/1) sand; moderate medium granular structure; very friable; many fine roots; extremely acid; clear wavy boundary.

A12—8 to 10 inches; dark gray (10YR 4/1) sand; common medium distinct gray (10YR 5/1) mottles; single grained; loose; common fine roots; extremely acid; gradual wavy boundary.

A2—10 to 25 inches; gray (10YR 6/1) sand; common medium distinct gray (10YR 5/1) and light gray (10YR 7/1) mottles; single grained; loose; few fine roots; extremely acid; clear wavy boundary.

Bh&A2—25 to 30 inches; dark grayish brown (10YR 4/2) sand; many coarse distinct gray (10YR 5/1) mottles consisting of material from the A2 horizon and common medium distinct very dark grayish brown (10YR 3/2) Bh fragments; single grained; loose; many uncoated sand grains; extremely acid; gradual wavy boundary.

B21h—30 to 40 inches; dark grayish brown (10YR 4/2) sand; common medium faint very dark grayish brown (10YR 3/2) mottles; single grained; loose; many uncoated sand grains; extremely acid; gradual wavy boundary.

B22h—40 to 45 inches; very dark grayish brown (10YR 3/2) sand; common coarse faint dark grayish brown (10YR 4/2) mottles; single grained; loose; many uncoated sand grains; extremely acid; clear wavy boundary.

B21tg—45 to 60 inches; grayish brown (2.5Y 5/2) sandy clay loam; few medium distinct yellowish brown (10YR 5/6) and few coarse faint dark grayish brown mottles; weak coarse subangular blocky structure; friable; sand grains moderately coated and bridged with clay; very strongly acid; gradual wavy boundary.

B22tg—60 to 64 inches; dark grayish brown (2.5Y 4/2) sandy loam; common coarse faint grayish brown (2.5Y 5/2) mottles; weak coarse subangular blocky structure; friable; sand grains moderately coated and bridged with clay; very strongly acid; gradual wavy boundary.

B3g—64 to 68 inches; dark grayish brown (2.5Y 4/2) loamy sand; massive; friable; very strongly acid.

The B'2tg horizon is at a depth of more than 40 inches. The A and Bh horizons are extremely acid to strongly acid. The B2t, B3g, and Cg horizons are very strongly acid or strongly acid.

The A1, or Ap, horizon has hue of 10YR, value of 1 to 4, and chroma of 2 or 1; or it has no hue (N), and value is 1 to 4. It is as much as 8 inches thick where value is 2 or 3. Its texture is sand or fine sand.

The A2 horizon has no hue (N) or has hue of 10YR or 2.5Y; value is 5 to 7, chroma is 2 to 0, and there are mottles in some pedons; or value is 5, chroma is 2, and there are mottles. Its texture is sand or fine sand.

The Bh&A2 horizon has the same colors as those of the component horizons. There is no Bh&A2 horizon in some pedons.

The B2h horizon does not meet the requirements of a spodic horizon. It mainly has hue of 10YR, value of 3, and chroma of 2 or 3 or value of 4 and chroma of 2 to 4; or hue of 7.5YR, value of 4, and chroma of 2 or 4; but it ranges to hue of 10YR, value of 5, and chroma of 2 to 4 where the A2 horizon has value of 7. Uncoated sand grains in the B2h horizon are common to many. The horizon is sand or fine sand.

The A'2 horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or less. Its texture is sand or fine sand. There is no A'2 horizon in some pedons.

The B2tg or B'2tg horizon has hue of 10YR or 5Y, value of 4 to 7, and chroma of 1 or 2; or hue of 2.5Y, value of 4 to 7, and chroma of 1 or 2; or hue of 2.5Y, value of 4 to 7, and chroma of 2; or it has no hue (N) and value of 4 to 7, and, in some pedons, mottles of yellow, brown, red, or gray. The control section is sandy loam or sandy clay loam. In some pedons the lower B2tg horizon is sandy clay.

The B3 or B'3g horizon has the same color range as that of the B2tg horizon. It ranges from loamy sand to fine sandy loam.

The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 8, and chroma of 4 or less. It ranges from sand to loamy fine sand. There is no Cg horizon in some pedons.

yellow mottles in lower 2 inches of horizon; weak medium granular structure; loose; common fine and coarse roots; few fine scattered carbon particles; dark brown staining along root channels; strongly acid; gradual wavy boundary.

C3—34 to 56 inches; yellowish brown (10YR 5/6) fine sand; weak medium granular structure; loose; few coarse roots; few fine faint gray splotches; sand grains lightly coated; very strongly acid; gradual wavy boundary.

C4—56 to 76 inches; very pale brown (10YR 7/3) fine sand; common fine and medium distinct strong brown (7.5YR 5/6) mottles; weak medium granular structure; loose; few coarse roots; many uncoated sand grains; strongly acid; gradual wavy boundary.

C5—76 to 86 inches; white (10YR 8/1) fine sand; few fine faint yellowish brown and very pale brown mottles; single grained; loose; few coarse roots; strongly acid.

These soils are fine sand to a depth of 80 inches or more. Reaction ranges from very strongly acid to medium acid in all horizons. The content of silt and clay in the 10- to 40-inch control section is less than 5 percent.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2 or value of 5 and chroma of 1; or hue of 2.5Y, value of 3 or 4, and chroma of 2. It is 3 to 8 inches thick.

The C horizon in the upper part has hue of 10YR, value of 6 or 7, and chroma of 3 or 4 or value of 5 and chroma of 2 to 8. In the lower part it has hue of 10YR, value of 6, and chroma of 1 to 3 or value of 7 and chroma of 1 to 4 or value of 8 and chroma of 1 or 2. In the lower part there are brown, yellow, or red mottles. In some pedons, large splotches or mottles that have chroma of 2 or 1 are within a depth of 40 inches. The colors are those of the sand grains and are not indicative of wetness.

The lower part of the C horizon, in pedons on benches along the larger streams and rivers, is at a depth of more than 40 inches; it is extremely hard (iron-cemented) sand or fine sand. It has hue of 10YR, value of 5 to 7, and chroma of 3 to 8.

Tomoka series

The Tomoka series consists of very poorly drained soils that formed in well decomposed organic material and in the underlying sandy and loamy mineral material. Permeability is moderate to moderately rapid. The soils are nearly level. They are in freshwater marshes. Slopes are less than 2 percent. In undrained areas the water table is at or above the surface except during extended dry periods. These soils are loamy, siliceous, dysic, hyperthermic Terric Medisaprists.

Tomoka soils are near Bradenton, Delray, Felda, and Floridana soils. All the associated soils are mineral soils and except for the Delray and Floridana soils are better drained than the Tomoka soils.

Typical pedon of Tomoka muck, about 5 miles southwest of Myakka City and 0.25 mile south of Cason Lake, NW1/4NW1/4 sec. 29, T. 36 S., R. 21 E.

Oa1—0 to 12 inches; black (5YR 2/1) muck; moderate medium granular structure; friable; extremely acid; gradual wavy boundary.

Oa2—12 to 18 inches; dark reddish brown (5YR 3/2) muck; moderate medium granular structure; friable; extremely acid; gradual wavy boundary.

Oa3—18 to 25 inches; black (5YR 2/1) muck; moderate medium granular structure; friable; extremely acid; gradual wavy boundary.

Oa4—25 to 28 inches; black (5YR 2/1) muck; common coarse distinct gray (10YR 5/1) sand lenses; moderate medium granular structure; friable; extremely acid; clear wavy boundary.

IIC1—28 to 32 inches; dark gray (10YR 4/1) and light brownish gray (10YR 6/2) sand; single grained; loose; strongly acid; clear wavy boundary.

IIC2—32 to 35 inches; black (10YR 2/1) sand and loamy sand; single grained; loose; medium acid; abrupt wavy boundary.

IIIC3—35 to 40 inches; gray (10YR 5/1) sandy clay loam; many fine and medium distinct very dark gray (10YR 3/1) and light gray (10YR 6/1) mottles and streaks of sand; massive; friable; slightly acid; gradual wavy boundary.

IIIC4—40 to 50 inches; gray (10YR 5/1) sandy clay loam; massive; friable; slightly acid; gradual wavy boundary.

IIIC5—50 to 75 inches; gray (10YR 5/1) sandy clay loam with common light gray (10YR 6/1) sand pockets and lenses; massive; friable; neutral.

Reaction of the Oa horizon is less than 4.5 in 0.01*M* CaCl2 and from 5.5 to 6.5 in field test. The IIC and IIIC horizons range from very strongly acid to neutral.

The Oa horizon has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; hue of 5YR, value of 3, and chroma of 2 or 3; or no hue (N) and value of 2. It ranges from 16 to 40 inches in thickness.

The IIC horizon has hue of 10YR or 2.5Y, value of 2 to 6, and chroma of 2 or 1. It ranges from sand to loamy fine sand. The IIIC horizon has hue of 10YR or 2.5Y, value of 2 to 7, and chroma of 2 or 1. It is sandy loam, fine sandy loam, or sandy clay loam. In many pedons there are lenses and pockets of finer or coarser textured material in the lower IIIC horizons.

Wabasso series

The Wabasso series consists of poorly drained, slowly permeable to very slowly permeable soils that formed in sandy and loamy marine sediment. The soils are nearly level. They are in areas of low, broad flatwoods on flood plains. In most years, if the soils are not drained, the water table is at a depth of 10 to 40 inches for more than 6 months of the year. It is at a depth of less than 10 inches for less than 60 days in wet seasons and is at a depth of more than 40 inches in very dry seasons. In some areas on flood plains, the soils are flooded frequently, and in other areas they are flooded only rarely. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

Wabasso soils are near Bradenton, limestone substratum, Delray, EauGallie, Felda, Floridana, and Palmetto soils. Bradenton, limestone substratum, soils do not have a sandy surface layer that is more than 20 inches thick or a spodic horizon. Delray and Floridana soils have a mollic epipedon, do not have a spodic horizon, and are in depressions. EauGallie soils have an argillic horizon at a depth between 40 and 80 inches. Felda soils do not have a spodic horizon. EauGallie and Felda soils are in the same positions on the landscape as Wabasso soils. Palmetto soils do not have a spodic horizon and are in poorly defined drainageways and sloughs.

Typical pedon of Wabasso fine sand, in an improved pasture, 1 mile north of Florida Highway 64, 1 mile southwest of Manatee River, NW1/4NW1/4 sec. 25, T. 34 S., R. 18 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) fine sand; mixture of organic matter and light gray sand grains has a salt and pepper appearance; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

A21—7 to 12 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; common uncoated sand grains; strongly acid; clear smooth boundary.

A22—12 to 21 inches; light gray (10YR 7/1) fine sand; single grained; loose; medium vertical dark gray and very dark gray streaks in the matrix and along root channels; few medium roots; very strongly acid; abrupt wavy boundary.

B21h—21 to 25 inches; black (5YR 2/1) fine sand; massive parting to moderate fine granular; sand grains are well coated with organic matter; few fine roots; very strongly acid; clear wavy boundary.

B22h—25 to 28 inches; dark reddish brown (5YR 2/2) fine sand; massive parting to weak fine granular; firm; few fine and medium roots; many sand grains coated with organic matter; very strongly acid; clear wavy boundary.

B3—28 to 31 inches; brown (10YR 4/3) fine sand; few medium faint very dark brown streaks and mottles; single grained; loose; many sand grains are thinly coated with organic matter; very strongly acid; gradual wavy boundary.

A'2—31 to 37 inches; pale brown (10YR 6/3) fine sand; few fine faint streaks of very dark grayish brown; single grained; loose; medium acid; gradual wavy boundary.

B'21t—37 to 46 inches; grayish brown (10YR 5/2) sandy loam; few medium prominent red (2.5YR 4/8) and distinct brownish yellow (10YR 6/8) mottles; weak fine granular structure; friable; sand grains are bridged and coated with clay; few fine light gray (10YR 7/1) sand lenses; slightly acid; gradual wavy boundary.

B'22t—46 to 65 inches; gray (10YR 6/1) sandy clay loam; few coarse distinct reddish yellow (7.5YR 6/6), strong brown (7.5YR 5/8), and dark brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; firm; sand grains are distinctly coated and bridged with clay; few thin patchy clay films on ped faces and in root channels; slightly acid; gradual wavy boundary.

Cg—65 to 80 inches; gray (10YR 6/1) sand mixed with many fine shell fragments; brownish yellow and strong brown mottles; single grained; mildly alkaline.

Reaction ranges from neutral to very strongly acid in the A, B2h, and B3 horizons and from medium acid to mildly alkaline in the horizons below.

The Ap, or A1, horizon has no hue (N) or has hue of 10YR; value is 2 or 3, and chroma is 1 or 2. It generally has a salt and pepper appearance where undisturbed. It ranges from 3 to 8 inches in thickness. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Total thickness of the A horizon is 16 to 30 inches.

The B2h horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 3 or less. It is 7 to 18 inches thick.

The B3 horizon has hue of 5YR to 10YR, value of 4, and chroma of 2 to 4. It is fine sand or sand and ranges to 6 inches in thickness. The B3&Bh horizon, where present, has matrix colors similar to those of the B3 horizon and also has black or dark reddish brown weakly cemented Bh fragments.

The A'2 horizon has no hue (N) or has hue of 10YR or 2.5Y; value is 5 to 8, and chroma is 3 or less. It is fine sand or sand and ranges to 14 inches in thickness.

The B'2t horizon has hue of 10YR, 2.5Y, and 5Y, value of 4 to 7, and chroma of 1 to 8. It has gray, brown, yellow, and red mottles. It is fine sandy loam, sandy loam, or sandy clay loam. In some pedons there are few to common, fine and medium nodules of white (10YR 8/1) carbonatic material. The B'2t horizon is at a depth between 26 and 40 inches. It is 15 to 30 inches thick.

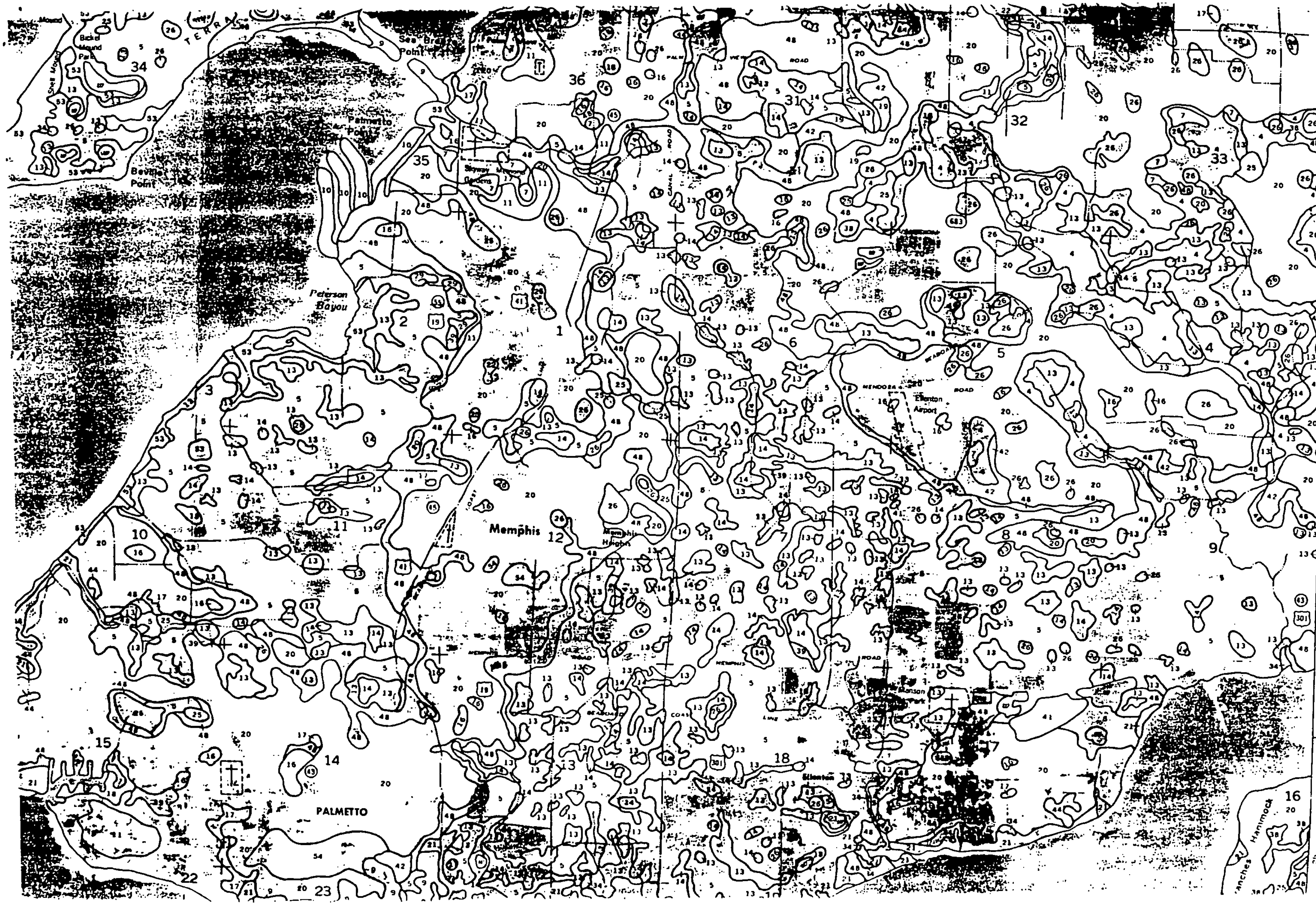
The Cg horizon has no hue (N) or has hue of 10YR; value is 5 to 7, and chroma is 1 or 0. It is a mixture of sand or loamy sand and shell fragments.

Wabasso Variant

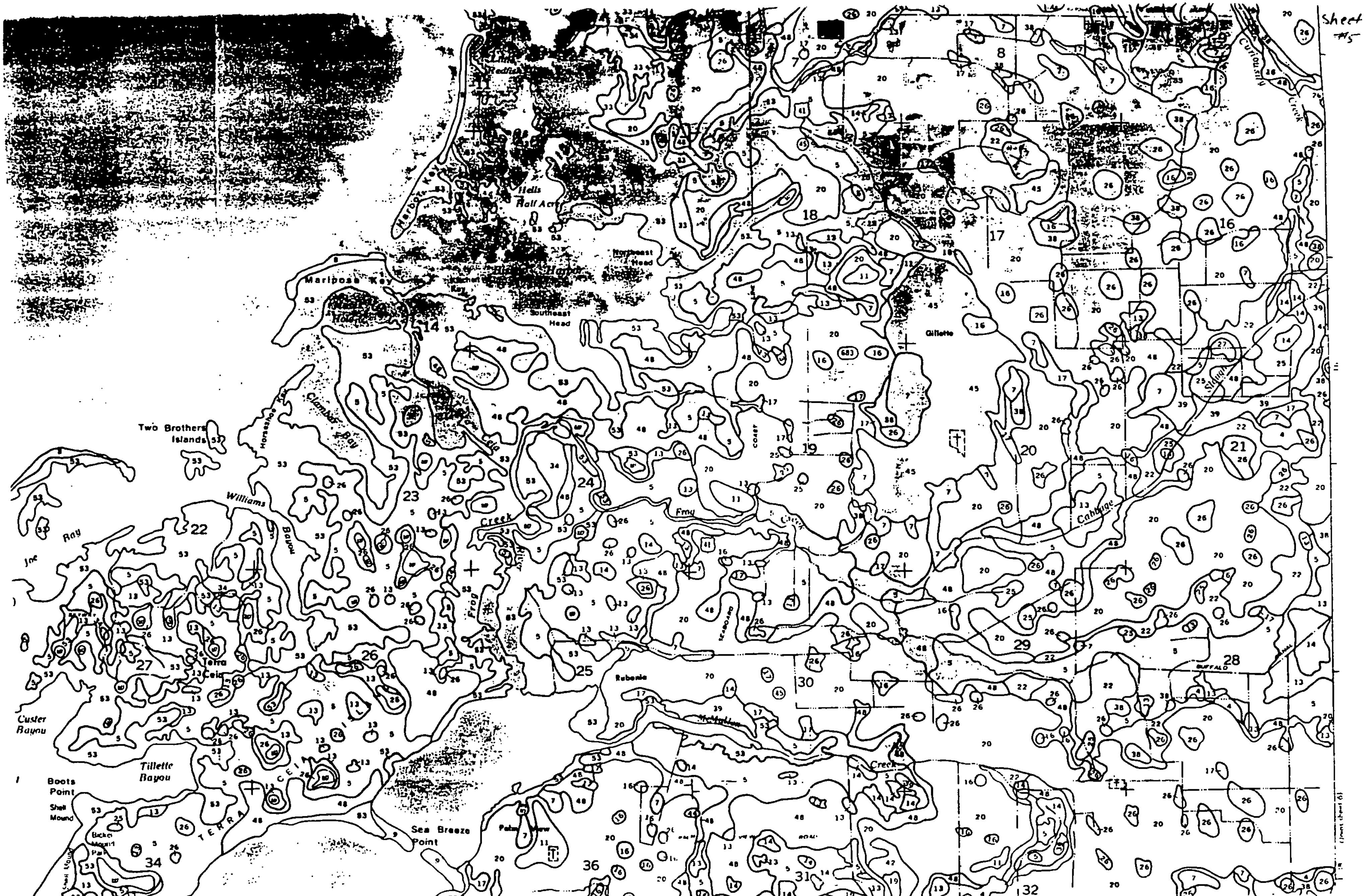
Wabasso Variant soils are poorly drained. They formed in sandy and loamy marine sediment overlying limestone. Permeability is slow to moderately slow. The soils are nearly level. They are in areas of low, broad flatwoods. Slopes are 0 to 2 percent. In most years, if the soils are

Sheet #5


(Joins sheet 4)
T. 34 S. | T. 33 S.
Sister Keys
Bickel Mound Park
Critical Bayou
Rattlesnake Key
TERRA CEIA
Clambar Bayou
Champlain Bayou
Snead Island
Peterson Bayou
Palmetto Point
Memphis
PALMETTO
MANATEE
Hooker Point
MENDOZA
Ellenton Airport
Ellenton
Marion Park


Peterson Bayou
Palmetto Point
Memphis
Memphis Heights
Ellenton Airport
Ellenton
PALMETTO

Sheet #5

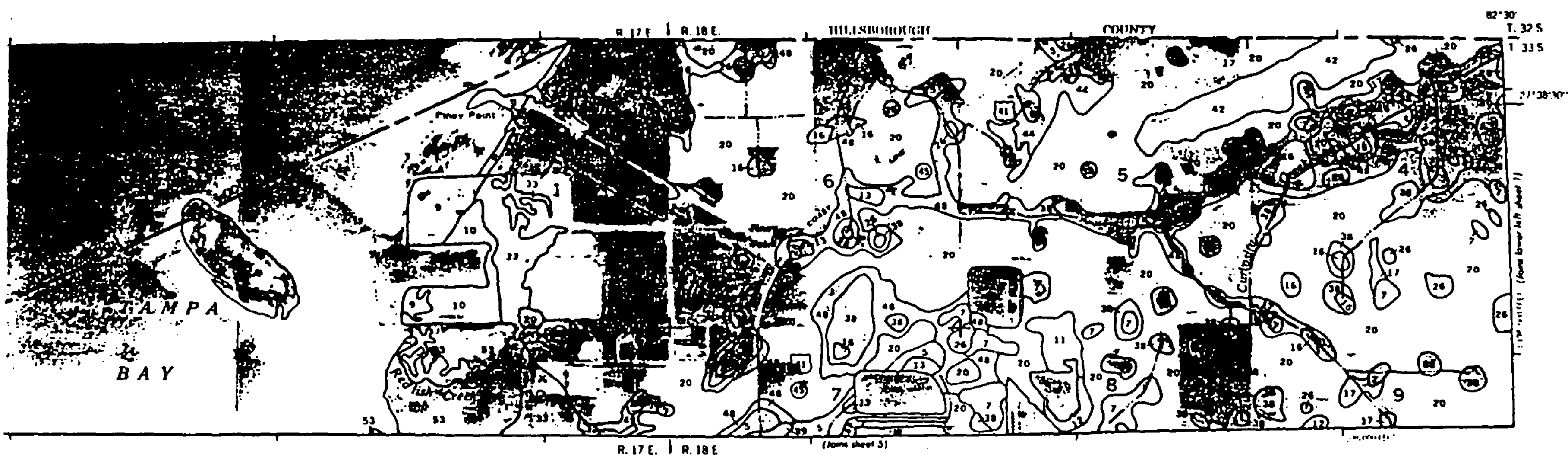

Sheet #5
Mariposa Key
Harbor Key
Hells Half Acre
Northeast Head
Southeast Head
Gillette
Two Brothers Islands
Horseshoe
Clambar Bay
Williams Bayou
Joe Bay
Frog Creek
Cabbage
Terra Ceia
Rubonia
McMullen Creek
Custer Bayou
Tillette Bayou
Boots Point
Shell Mound
Sea Breeze Point
Buffalo
Curiosity Creek


TAMPA BAY
Mariposa Key
Moses Hole
Southeast Head
Harbor Key
Hells Half Acre
Little Redfish Cr
Two Brothers Islands
Horseshoe Key
Clambar Bay
Joe Island
Joe Bay
Williams
Frog Creek
Terra Ceia
Paradise Island
Big Miguel
Little Miguel Pass
Skeet Key
Fletcher Point
Custer Bayou
Miguel Bay
Boots Point
Tillette Bayou
Shell Mound
Sister Keys
Sea Breeze Point
Rubonia
McMullen Creek
Gillette
Sunshine
(Joins sheet 4)

Sheet #5

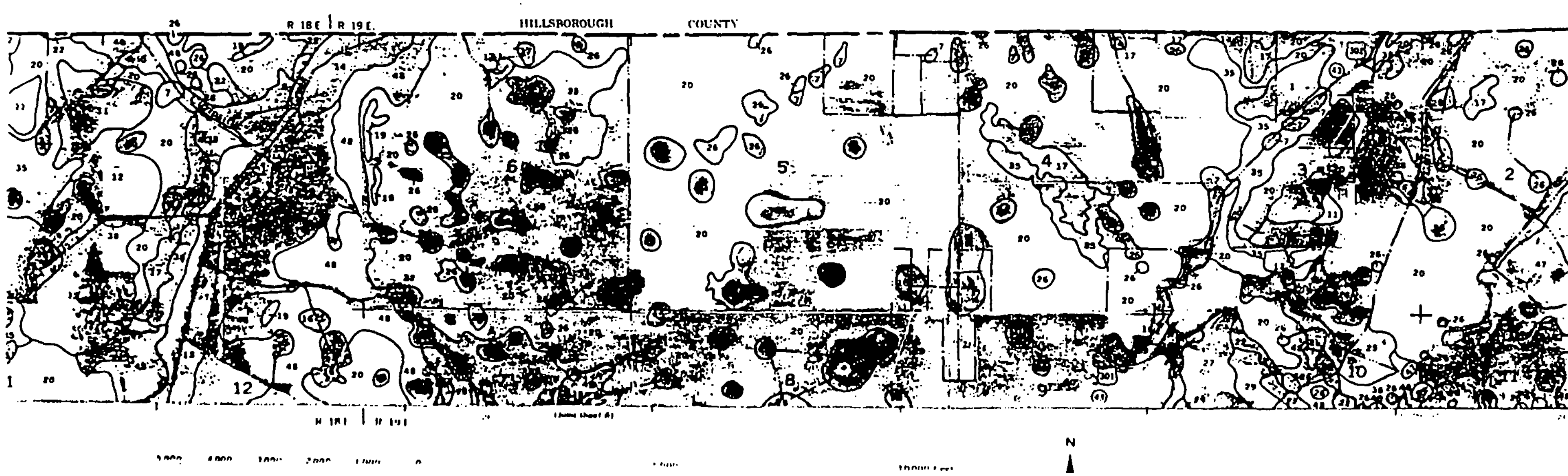
Sheet #1

This map was compiled by U.S. Department of Agriculture



R. 17 E. | R. 18 E.
HILLSBOROUGH
COUNTY
82°30'
T. 32 S.
T. 33 S.
27°38'30"
Piney Point
TAMPA
BAY
R. 17 E. | R. 18 E.
(Joins sheet 5)

Sheet #1



R. 18 E. | R. 19 E.
HILLSBOROUGH
COUNTY
T. 33 S. | T. 32 S.
(Joins sheet 6)
N

REFERENCE 17

STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES
Tom Gardner, *Executive Director*

DIVISION OF RESOURCE MANAGEMENT
Jeremy A. Craft, *Director*

FLORIDA GEOLOGICAL SURVEY
Walter Schmidt, *State Geologist*

BULLETIN NO. 59

THE LITHOSTRATIGRAPHY OF THE HAWTHORN GROUP (MIOCENE) OF FLORIDA

By
Thomas M. Scott

Published for the
FLORIDA GEOLOGICAL SURVEY
TALLAHASSEE
1988

DEPARTMENT
OF
NATURAL RESOURCES

DEPARTMENT
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NATURAL RESOURCES

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LETTER OF TRANSMITTAL

Bureau of Geology
August 1988

Governor Bob Martinez, Chairman
Florida Department of Natural Resources
Tallahassee, Florida 32301

Dear Governor Martinez:

The Florida Geological Survey, Bureau of Geology, Division of Resource Management, Department of Natural Resources, is publishing as its Bulletin No. 59, *The Lithostratigraphy of the Hawthorn Group (Miocene) of Florida*. This is the culmination of a study of the Hawthorn sediments which exist throughout much of Florida. The Hawthorn Group is of great importance to the state since it constitutes the confining unit over the Floridan aquifer system. It is also of economic importance to the state due to its inclusion of major phosphorite deposits. This publication will be an important reference for future geological investigations in Florida.

Respectfully yours,

Walter Schmidt, Chief
Florida Geological Survey

Printed for the
Florida Geological Survey

Tallahassee
1988

ISSN 0271-7832

SOUTH FLORIDA

Although the Hawthorn Group in south Florida consists of the same general sediment types (carbonate, quartz sand, clay and phosphate), the variability and complexity of the section is different from the strata in northern Florida. In the south Florida area (Figure 1), particularly the western half of the area, the Hawthorn Group consists of a lower, predominantly carbonate unit and an upper, predominantly siliciclastic unit. Eastward the section becomes more complex due to a greater percentage of siliciclastic beds present in the lower portion of the Hawthorn Group.

The differences that exist between the northern and southern sections of the Hawthorn Group require separate formational nomenclature. In southern Florida, the Hawthorn Group consists of in ascending order, the Arcadia Formation (new name) with the Tampa and Nocatee (new name) Members and the Peace River Formation (new name) with the Bone Valley Member (Figure 33). The new nomenclature helps alleviate many of the previously existing problems associated with the relationship of the Bone Valley, Tamiami, Hawthorn, and Tampa units in the south Florida region.

ARCADIA FORMATION

Definition and Type Section

The Arcadia Formation is a new formational name proposed here for the lower Hawthorn carbonate section in south Florida. This unit includes sediments formerly assigned to the Tampa Formation or Limestone (King and Wright, 1979) and the "Tampa sand and clay" unit of Wilson (1977).

Dall and Harris (1892) used the term "Arcadia marl" to describe beds along the Peace River. This term was never widely used and did not appear in the literature again except in reference to Dall and Harris. It appears that their use of the "Arcadia marl" described a carbonate bed now belonging in the Peace River Formation of the upper Hawthorn Group. Riggs (1967) used the term "Arcadia formation" for the carbonate beds often exposed at the bottom of the phosphate pits in the Central Florida Phosphate District. Riggs' use of this name was never formalized. The "Lexicon of Geologic Names" (U.S.G.S., 1966) listed the name Arcadia as being used as a member of the Cambrian Trempealeau Formation in Wisconsin and Minnesota, thereby precluding its use elsewhere. Investigations into the current status of this name indicated that the Arcadia member has not been used in some 25 years and does not fit the current Cambrian stratigraphic framework. The Lexicon also indicates Arcadia clays as an Eocene (Claibornian) unit in Louisiana. This name also has been dropped from the stratigraphic nomenclature of Louisiana (Louisiana Geological Survey, 1984, personal communication). Since these former usages of this name are no longer viable, the term can be used for the lower Hawthorn Group sediments in southern Florida in accordance with Article 20 of the North American Code of Stratigraphic Nomenclature (NACSN, 1983).

The Arcadia Formation is named after the town of Arcadia in DeSoto County, Florida. The type section is located in core W-12050, Hogan #1, DeSoto County (SE¼, NW¼, Section 16, Township 38S, Range 26E, surface elevation 62 feet (19 meters)) drilled in 1973 by the Florida Geological Survey. The type Arcadia Formation occurs between -97 feet MSL (-30 meters MSL) to -520 feet MSL (-159 meters) (Figure 34).

Two members can be recognized within the Arcadia Formation in portions of south Florida. These are the Tampa Member and the Nocatee Member (Figure 33). The members are not recognized throughout the entire area. When the Tampa and Nocatee are not recognized, the section is simply referred to as the Arcadia Formation.

Lithology

The Arcadia Formation, with the exception of the Nocatee Member, consists predominantly of limestone and dolostone containing varying amounts of quartz sand, clay and phosphate grains. Thin beds of quartz sand and clay often are present scattered throughout the section. These thin sands and clays are generally very calcareous or dolomitic and phosphatic. Figure 34 graphically illustrates the lithologies of the Arcadia Formation including the Tampa and Nocatee Members. The lithologies of the

Tampa and Nocatee Members will be discussed separately from the undifferentiated Arcadia Formation.

Dolomite is generally the most abundant carbonate component of the Arcadia Formation except in the Tampa Member. Limestone is common and occasionally is the dominant carbonate type. The dolostones are quartz sandy, phosphatic, often slightly clayey to clayey, soft to hard, moderately to highly altered, slightly porous to very porous (moldic porosity) and micro- to fine crystalline. The dolostones range in color from yellowish gray (5 Y 8/1) to light olive gray (5 Y 6/1). The phosphate grain content is highly variable ranging up to 25 percent but is more commonly in the 10 percent range. The limestones of the Arcadia are typically quartz sandy, phosphatic, slightly clayey to clayey, soft to hard, low to highly recrystallized, variably porous and very fine to fine grained. The limestones are typically a wackestone to mudstone with few beds of packstone. They range in color from white (N 9) to yellowish gray (5 Y 8/1). The phosphate grain content is similar to that described for the dolostones. Fossils are generally present only as molds in the carbonate rocks.

Clay beds occur sporadically throughout the Arcadia Formation. They are thin, generally less than 5 feet thick, and of limited areal extent. The clays are quartz sandy, silty, phosphatic, dolomitic and poorly to moderately indurated. Color of the clay ranges from yellowish gray (5 Y 8/1) to light olive gray (5 Y 6/1). Lithoclasts of clay are often found in other lithologies. Smectite, illite, palygorskite, and sepiolite comprise the clay mineral suite (Reynolds, 1962).

Quartz sand beds also occur sporadically and are generally less than 5 feet thick. They are very fine to medium grained (characteristically fine grained), poorly to moderately indurated, clayey, dolomitic and phosphatic. The sands are usually yellowish gray (5 Y 8/1) in color.

Chert is also sporadically presently in the Arcadia Formation in the updip areas (portions of Polk, Hillsborough, Manatee and Hardee Counties). In many instances the chert appears to be silicified clays and dolosilts.

Subjacent and Suprajacent Units

The Arcadia Formation overlies either the Ocala Group or the "Suwannee" Limestone in the south Florida region (Figure 8). The contact between the basal Arcadia and the Ocala Group is an easily recognized unconformity. In the north central and northeastern portions of southern Florida, where the Hawthorn Group overlies the Ocala Group (Figures 8 and 41), the Arcadia is characteristically a gray, hard, quartz sandy, phosphatic dolostone with a few siliciclastic interbeds. This is in contrast to the Ocala Group, which is a cream to white, fossiliferous, soft to hard limestone (packstone to wackestone).

Throughout most of south Florida, the Hawthorn Group overlies limestones most often referred to as the "Suwannee" Limestone (Figure 33). In much of this area the contact is recognizably unconformable. The contrast between the sandy, phosphatic, fine-grained to finely crystalline carbonates of the Arcadia and the coarser grained nonphosphatic, non-quartz-sandy limestones of the "Suwannee"* Limestone allow the contact to be easily placed. However, in the downdip areas (e.g., Lee and Charlotte Counties and further south) the contact becomes more obscure. In this area the contact is placed at the base of the last occurrence of a sandy, variably phosphatic carbonate.

The limestones underlying the Arcadia are referred to as "Suwannee" limestone due to the uncertainty of the formational assignment. These sediments have characteristically been called "Suwannee" by previous workers despite the fact that they have never been accurately correlated with the typical Suwannee Limestone in northern Florida. Hunter (personal communication, 1984) believes that these carbonates are not Suwannee or the equivalent but are an unnamed limestone of Chickasawhayan Age (Late Oligocene).

Unconformably overlying the Arcadia Formation is the Peace River Formation (Figure 33). The Peace River Formation is predominantly a siliciclastic unit with varying amounts of carbonate beds. The percentage of carbonate beds is higher near the base of the Peace River, resulting in a transitional or gradational contact with the Arcadia. In some areas the contact is often marked by a phosphatic rubble zone and/or a phosphatized dolostone hardground. In the more gradational sequence the contact is placed where the carbonate beds become significantly more abundant than the siliciclastic beds.

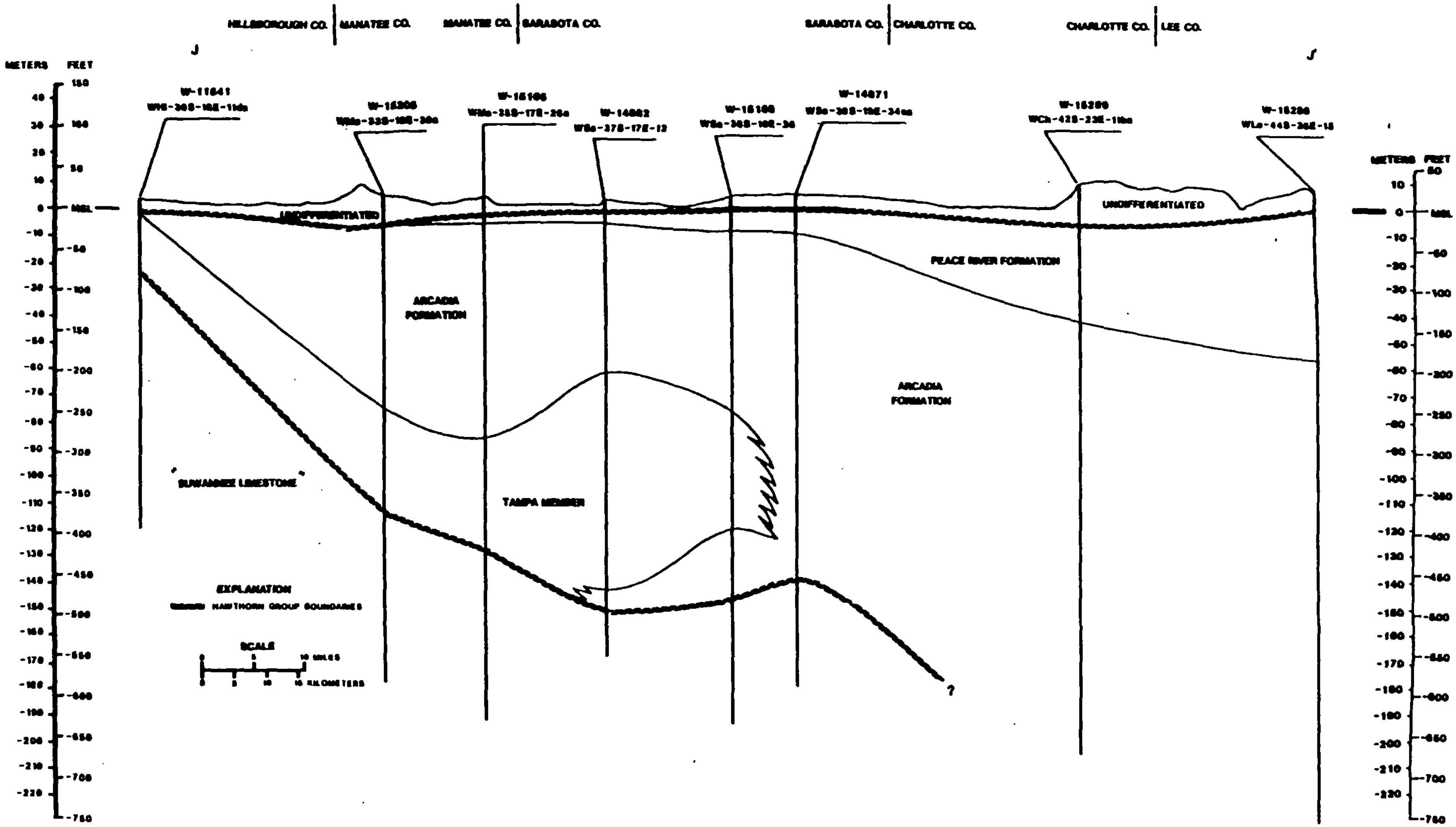

Figure 38. Cross section J-J' (see figure 3 for location).

Lithology

The Tampa Member consists predominantly of limestone with subordinate dolostone, sands, and clays. The lithology of the Tampa is very similiar to the limestone portion of the Arcadia Formation with the exception of its phosphate content which is almost always noticeably less than in the Arcadia. Phosphate grains generally are present in the Tampa in amounts less than 3 percent although beds containing greater percentages do occur, particularly near the facies change limits of the member.

Lithologically, the limestones are variably quartz sandy and clayey with minor to no phosphate. Fossil molds are often present and include mollusks, foraminifera and algae. Colors range from white (N 9) to yellowish gray (5 Y 8/1). The limestones range from mudstones to packstones but are most often wackestones. The dolostones are variably quartz sandy and clayey with minor to no phosphate. They are typically microcrystalline to very fine grained and range in color from pinkish gray (5 YR 8/1) to light olive gray (5 Y 6/1). The dolostones often contain fossil molds similar to those in the limestones.

Sand and clay beds occur sporadically within the Tampa Member. Lithologically, they are identical to those described for the Arcadia Formation except for the phosphate content which is significantly lower in the Tampa Member.

Siliceous beds are often present in the more updip portions of the Tampa. In the type area near Tampa Bay the unit is well known for silicified corals, siliceous pseudomorphs of many different fossils and chert boulders.

Subjacent and Suprajacent Units

The Tampa Member overlies the "Suwannee" Limestone in areas where the Nocatee Member is not present and the Tampa Member forms the base of the Arcadia. The boundary often appears gradational as discussed by King (1979) and King and Wright (1979). Figure 19 indicates an unconformable time relationship with the "Suwannee" Limestone which often is not apparent lithologically. This indicates a probable reworking of underlying materials into the Tampa Member obscuring the unconformity.

The Tampa Member overlies the Nocatee Member in the area where both are present (Figure 33). The contact appears conformable and is easily recognized. In a few areas where the Nocatee is absent, the Tampa may overlie undifferentiated Arcadia Formation sediments. The Tampa Member may be both overlain and underlain by undifferentiated Arcadia.

The Tampa Member is overlain throughout most of its extent by carbonates of the undifferentiated Arcadia Formation. The contact often appears gradational over one or two feet. An increase in phosphate grain content is the dominant factor in defining the lithologic break. In updip areas the Tampa may be overlain by siliciclastic sediments of the Peace River Formation. Further updip it may be exposed at the surface or covered by a thin veneer of unconsolidated sands and clays which may represent residuum of the Hawthorn sediments. Figure 35 through 39 show the relationship of the Tampa Member to the overlying and underlying units.

Thickness and Areal Extent

The Tampa Member is quite variable in thickness throughout its extent. It thins updip to its northern limit where it is absent due to erosion and possibly nondeposition. The thickest section of Tampa encountered is in W-14882 in Sarasota County where 270 feet (82 meters) of section are assigned to this member (Figure 45). More typically an average thickness is approximately 100 feet (30.5 meters).

The top of the Tampa Member (Figure 46) ranges in elevation from as high as +75 feet (23 meters) MSL in northeastern Hillsborough County to -323 feet (-98.5 meters) MSL in northern Sarasota County. The lowest elevation for the top of the unit occurs in a rather large depression that encompasses part of northern Sarasota County and southern Manatee County.

The Tampa dips towards the south in the northern half of the area of occurrence (Figure 46). Dip direction in the southern half is more to the southwest and west. Dip angle varies from place to place but the

REFERENCE 18

HYDROGEOLOGI[redacted]THE FLORIDAN AQUIFER[redacted]RIDA AND IN PARTS OF GEORGIA, ALABAMA, AND SOUTH CAROLINA

REGIONAL AQUIFER-SYSTEM ANALYSIS

Hydrogeologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina

By JAMES A. MILLER

REGIONAL AQUIFER-SYSTEM ANALYSIS

U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1403–B

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON: 1986

grade updip by facies change into calcareous, glauconitic, clastic rocks. This carbonate-clastic transition lies farther to the north and west in lower Eocene strata than it does in the underlying Paleocene and is located still farther north and west in middle Eocene rocks. Upper Eocene rocks retain their carbonate character in many places up to the point where they are truncated by erosion. The overall effect is that of a general regional transgression that began in Paleocene time and persisted through the late Eocene and during which the marine facies of progressively younger rocks extended progressively farther and farther inland. Several minor regressions punctuated this general transgression. These observations are consistent with the sea level curve of Vail and others (1977), which shows that sea level worldwide became progressively higher from early to late Eocene time.

Rocks of early Eocene age

Downdip, a lower Eocene carbonate sequence underlies southeastern Georgia and the Florida peninsula; updip, the remainder of the study area is underlain by clastic lower Eocene rocks. Locally, in South Carolina, the Eocene in the subsurface is an impure limestone. Plate 4 shows the configuration of the top of rocks of early Eocene age and the area where they crop out. Comparison of plate 4 with a map of the structural surface of the Paleocene (pl. 3) shows that, in Alabama and southwestern Georgia, lower Eocene rocks lie to the south and east of Paleocene rocks in offlap relationship. In central Georgia, however, beds of early Eocene age overlap and extend farther to the north than the underlying Paleocene rocks. Lower Eocene rocks are known to extend farther to the north in this overlap area than plate 4 shows, but they have been mapped during this study only to the limits of the well control used to delineate the Floridan aquifer system. In the western part of the study area, the configuration of the top of the early Eocene is contoured up to the limit of outcrop of these rocks (pl. 4).

Many of the large- to intermediate-scale structural features that affect the shape of the Paleocene surface (pl. 3) are recognizable on the early Eocene surface (pl. 4). Those features common to both maps include (1) the Peninsular arch in north-central Florida, (2) the Southeast Georgia embayment, and (3) a steep, steady slope toward the Gulf Coast geosyncline in the western part of the study area. The Southwest Georgia embayment in eastern panhandle Florida is a negative area on both the Paleocene and early Eocene tops, but this feature is deeper and narrower and extends farther to the northeast on the early Eocene surface than it does on the top of the Paleocene. The configuration of the South Florida basin in southwestern peninsular Florida likewise differs on the Paleocene and early Eocene surfaces. This feature was somewhat silled on its gulfward side in Paleocene time (pl. 3) but, at the end of early Eocene time (pl. 4) it was open to the gulf and appears to have been partially filled from the east and northeast. The Suwannee strait, a closed low that appears in southeastern Georgia on the map of the Paleocene surface, was apparently filled with sediments during early Eocene time and thus does not exist on the map of the early Eocene surface.

The maximum measured depth to the top of lower Eocene rocks is about 3,900 ft below sea level in well ALA-BAL-30 in the southern part of Baldwin County, Ala. The maximum contoured depth is below 4,200 ft, in the same general area. Lower Eocene rocks are slightly less than 800 ft below sea level on the crest of the Peninsular arch, from which they deepen in all directions. In the Southwest Georgia embayment and the South Florida basin, the top of lower Eocene rocks is below 2,600 ft.

The thickness of lower Eocene strata is shown on plate 5, along with the distribution of the clastic and carbonate facies within this unit. The clastic-carbonate boundary and much of the contouring shown on this plate are derived from well control. In areas of sparse control, the thickness of the early Eocene has been estimated as the difference between contoured altitudes of the top of the early Eocene (plate 4) and the top of the Paleocene (plate 3). In south Florida, lower Eocene rocks are more than 1,500 ft thick; in parts of panhandle Florida, they are more than 1,100 ft thick. On the crest of the Peninsular arch, these strata are less than 300 ft thick, and they thin to a featheredge in areas of outcrop.

Oldsmar Formation—Except for the Fishburne Formation that occurs locally in South Carolina, all the lower Eocene carbonate rocks in the study area are part of the unit that Applin and Applin (1944) named the Oldsmar Limestone. The Oldsmar, however, contains much dolomite, and thin beds of chert and evaporite deposits occur in the unit from place to place. The Oldsmar is therefore referred to as a "formation" rather than a "limestone."

The Oldsmar Formation consists mostly of off-white to light-gray micritic to finely pelletal limestone thickly to thinly interbedded with gray to tan to light-brown, fine to medium crystalline, commonly vuggy dolomite. The lower part of the formation is usually more extensively dolomitized than the upper part. Pore-filling gypsum and thin beds of anhydrite occur in the lowermost parts of the Oldsmar in places, particularly in a crescent-shaped band extending from Dixie County, Fla., northeast to southern Ware County, Ga

The location of this band, which locally comprises the base of the Floridan aquifer system, is shown on plate 33. In scattered places, the Oldsmar contains trace amounts of glauconite.

Applin and Applin (1944, p. 1699) defined the Oldsmar "to include the interval that is marked at the top by the presence of abundant specimens of *Helicostegina gyralis* Barker and Grimsdale...and that rests on the Cedar Keys limestone." This definition is unsatisfactory because (1) it is based on the microfaunal content of the strata, not on their lithologic characteristics, and (2) it is based on a species whose range is not restricted to the early Eocene. The author has found specimens of *H. gyralis* that show no evidence of reworking 50 to 70 ft above the top of the Oldsmar in rocks that are part of the overlying middle Eocene sequence ("Lake City" Limestone). Cole and Gravell (1952) reported this species from middle Eocene beds in Cuba. The Oldsmar Formation is thus redefined herein as the sequence of white to gray limestone and interbedded tan to light-brown dolomite that lies between the pelletal, predominantly brown limestone and brown dolomite of the middle Eocene and the gray, coarsely crystalline dolomite of the Cedar Keys Formation. *H. gyralis* is commonly found as part of a characteristic Oldsmar fauna that includes several other species of larger foraminifers listed in table 1. None of these species, however, is ubiquitous within the Oldsmar Formation, nor should they be the criterion by which the Oldsmar is defined.

The Oldsmar Formation underlies all of the Florida peninsula and the southeastern corner of Georgia (pl. 5). Westward, in the eastern part of the Florida panhandle, the Oldsmar becomes increasingly argillaceous and interfingers with calcareous clastic rocks. To the north, in south-central Georgia, the Oldsmar grades from limestone through argillaceous limestone and calcareous clay into glauconitic calcareous sand.

In addition to *H. gyralis*, the larger Foraminifera *Miscellanea nassauensis* Applin and Jordan, *Pseudophragmina (Proporocyclina) cedarkeysensis* Cole, and *Lockhartia sp.* are considered characteristic of the Oldsmar Formation.

UNDIFFERENTIATED LOWER EOCENE ROCKS—Lower Eocene rocks in the western part of the Florida panhandle consist of brownish- to greenish-gray, calcareous, slightly glauconitic shale and siltstone that are occasionally micaceous. Thin beds of fine-grained, slightly glauconitic sandstone and off-white sandy glauconitic limestone occur sporadically throughout the predominantly argillaceous section. These rocks are part of the unit that was called the "clastic facies of Wilcox age" by Applin and Applin (1944) and the "Wilcox Formation" by Chen (1965). Both Chen and the Applins included beds that are the downdip equivalents of the Nanafalia Formation, the Tuscahoma Formation, and the Salt Mountain Limestone in their "Wilcox" unit. In this report, the Nanafalia, Tuscahoma, and Salt Mountain are considered to be of Paleocene age and to grade downdip into undifferentiated argillaceous rocks of Paleocene age. The term "undifferentiated early Eocene rocks" is herein applied to the massive, predominantly argillaceous early Eocene section of western panhandle Florida. These strata grade eastward into the Oldsmar Formation and become less marine and slightly coarser grained updip in southern Alabama and southwestern Georgia, where they take on the character of the outcropping Hatchetigbee Formation.

Microfauna considered characteristic of undifferentiated rocks of early Eocene age include the Foraminifera *Globorotalia formosa gracilis* Bolli and *Rotalia trochoidiformis* (Lamarck). The Foraminifera *Globorotalia subbotinae* Morozova and *G. wilcoxensis* (Cushman and Ponton) are also considered characteristic of early Eocene rocks in the study area, even though these species are known to range downward into rocks of late Paleocene age elsewhere (Stainforth and others, 1975). The Ostracoda *Brackhcythere jessupensis* Howe and Garrett and *Haplocytheridea sabinensis* (Howe and Garrett) are also considered characteristic of these beds.

BASHI AND HATCHETIGBEE FORMATIONS—The lithology of the Hatchetigbee Formation in the area where it crops out in western Alabama is very similar to that of the underlying Tuscahoma. In practice, the two are difficult to separate except where the sandy, glauconitic, highly fossiliferous Bashi Formation (Gibson, 1982b) lies between them. The Bashi occurs only as erosional remnants in eastern Alabama and western Georgia. Downdip, the Hatchetigbee consists of interbedded fine sand and gray calcareous clay. The sand is lost in a short distance gulfward, and the argillaceous Hatchetigbee beds merge in middip areas with the underlying clay of the Tuscahoma.

UNNAMED MID-GEORGIA LOWER EOCENE ROCKS—In the west-central part of the Georgia coastal plain, lower Eocene rocks consist of medium-grained, calcareous, often dolomitic, glauconitic sandstone interbedded with soft, light-gray, calcareous, glauconitic clay. The sandstone ranges from unconsolidated to well indurated, depending on the amount of calcareous matrix that binds the sand grains. Although these strata are the probable equivalents of the combined Hatchetigbee Formation of eastern Alabama and southwestern Georgia, they are unnamed at present and are not shown on the correlation chart (pl. 2) because their relation to the Hatchibtigbee is still inexactly known.

Georgia and peninsular Florida appear to die out downward within the middle Eocene. An exception is the fault in Palm Beach County, Fla., which cuts rocks at least as old as Paleocene (pl. 3). The series of northeast-trending faults in south-central Georgia bounds several small grabens and half grabens that are collectively called the Gulf Trough (Herrick and Vorhis, 1963). Like most of the faults in peninsular Florida, the Gulf Trough faults appear to die out at shallow depths. A seismic profile was obtained across one of the major Gulf Trough faults in northeastern Colquitt County, Ga., as part of this study. The record on this profile is poor down to a depth of approximately 1,200 ft below land surface. Deeper than about 1,300 ft (roughly the middle of rocks of middle Eocene age), however, sharp reflectors can easily be traced on the profile and do not show the graben structure that well data prove to exist at shallower depths.

The maximum measured depth to the top of the middle Eocene is 3,490 ft below sea level in well ALA-BAL-30 in southwestern Baldwin County, Ala. The maximum contoured depth is below 3,700 ft in the same area (pl. 6). The top of the middle Eocene slopes in all directions from the crest of the Peninsular arch and reaches depths of more than 1,800 ft in the Southwest Georgia embayment, more than 1,600 ft in the South Florida basin, and more than 1,000 ft in the Southeast Georgia embayment. Middle Eocene rocks are slightly above sea level at scattered places on the Peninsular arch. They are exposed at the surface in Citrus and Levy Counties, Fla., where they represent the oldest outcropping rocks in the state.

The thickness of middle Eocene rocks is shown on plate 7, which also shows the limits of the unit's clastic and carbonate facies. The position of the interface between these facies is approximate because it is based on well control. The thickness trends shown on plate 7 have been extended in areas where well control is scattered by subtracting the contoured tops of rocks of early and middle Eocene age. From a featheredge in outcrop areas, the middle Eocene thickens seaward to more than 1,200 ft in the Southwest Georgia embayment and to more than 1,000 ft in southeastern Georgia. Along panhandle Florida's Gulf Coast, these strata are more than 900 ft thick. They thin to less than 500 ft over the crest of the Peninsular arch and thicken southward to more than 1,600 ft in east-central peninsular Florida. Although the middle Eocene is between 1,000 and 1,400 ft thick in most of southern Florida, the unit thins to less than 900 ft in part of the South Florida basin, and shows that this basin was not subsiding rapidly during middle Eocene time.

✱ Avon Park Formation—Applin and Applin (1944, p. 1686) applied the name Avon Park Limestone to the upper part of the late middle Eocene section in a well at the Avon Park Bombing Range in the southernmost part of Polk County, Fla. They referred to the Avon Park as "a distinct faunal unit" and described it as "mainly cream-colored, highly microfossiliferous, chalky limestone" that locally contains some gypsum and chert and that is commonly partially dolomitized. Well cuttings examined during this study show that the Avon Park is in many places composed almost entirely of dolomite. The Avon Park is thus referred to in this report as a "formation" rather than a "limestone."

The term Lake City Limestone was introduced by Applin and Applin (1944, p. 1693) for the lower part of rocks of middle Eocene age in a well at Lake City in Columbia County, Fla. The Lake City was described as "alternating layers of dark brown and chalky limestone"; gypsum and chert are present in some wells. Regionally, the lower part of the middle Eocene, like the upper part, contains much dolomite.

In the early 1940's, there were few deep wells in Florida, and the samples from many of these wells were either contaminated or incomplete. Electric logging was a new technique at the time, and those few logs that were in existence were largely unreliable. A common practice in subsurface stratigraphy was to use paleontologic and lithologic units interchangeably. All of these factors led to imprecise definitions for most of the limestone units of Florida. Between some adjacent "formations," lithologic change is subtle; in places, there is no change at all. Stratigraphic breaks in much of the Florida section currently are based upon a change in the benthic microfauna that the rocks contain. Where dolomitization has obliterated the microfauna, or where it is lacking in nondolomitized sections, correlations are inconsistent. Although most workers studying the Florida subsurface recognize the problem, almost all Tertiary limestone correlations are still made on the basis of the microfaunal assemblages that Applin and Applin (1944) and Applin and Jordan (1945) thought were diagnostic. This practice is, of course, not in accordance with the rules of the current North American Stratigraphic Code (North American Commission on Stratigraphic Nomenclature, 1983). Units that are in reality biostratigraphic units have been mapped as if they were rock-stratigraphic units. Fortunately, as Winston (1976), recognized, the paleontologically defined units of Applin and Applin (1944) in many cases coincide with lithologic units. Exceptions to this generalization are the Avon Park and Lake City Limestones.

There are no lithologic criteria that can be used to separate the middle Eocene carbonate rocks in Florida and in southern Georgia. Both the so-called Avon Park and Lake City Limestones consist primarily of cream, tan, or light-brown, soft to well-indurated limestone that is mostly pelletal but is locally micritic. The pellets consist of fine to coarse sand-sized particles of micritic to fine crystalline limestone and small- to medium-sized Foraminifera; they are bound by a micritic to finely crystalline limestone matrix. The limestone is thinly to thickly interbedded with cream or light- to dark-brown, fine to medium crystalline, slightly vuggy dolomite, fractured in some places, whose texture is locally sucrosic to argillaceous. Locally, differences exist between the general lithologic character of the lower part of the middle Eocene and that of its upper part. Unfortunately, two of the limited number of wells available to the Applins (the Avon Park Bombing Range and Lake City wells) showed such contrasts, and it was on the basis of the limited data then available that the Avon Park and Lake City were named and extended regionally. More recent drilling shows conclusively that the rock types that the Applins thought were representative of their "Lake City" are found in many places at the top of the middle Eocene (in their "Avon Park" part) and the reverse is also true.

Paleontologic criteria by which the Avon Park and Lake City can be differentiated are lacking. In the original definition of both the Avon Park and the Lake City, certain faunal zones by which these units could be recognized were listed. The Lake City was thought to extend from the highest occurrence of *Dictyoconus americanus* (Cushman), accompanied by *Fabularia vaughani* Cole and Porter, down to the highest occurrence of *Helicostegina gyralis* Barker and Grimsdale, thought to characterize the Oldsmar. None of these species is restricted to the horizon for which it is supposed to be characteristic. *H. gyralis* commonly occurs several hundred feet above a typical Oldsmar lithology. In this study, *Fabularia vaughani* has been found at or just below the top of the middle Eocene—in the "Avon Park" part. *Dictyoconus americanus* has been reported by Cole (1944, 1945) and by Vernon (1951) from the upper part of the middle Eocene. The author has found several additional species that were listed as diagnostic Lake City Foraminifera by Applin and Jordan (1945) within 20 to 50 feet of the top of the uppermost middle Eocene. These species include *Discorbis inornatus* Cole, *Fabularia gunteri* Applin and Jordan, and *Gunteria floridana* Cushman and Ponton. Cole and Gravell (1952) found several supposedly diagnostic Lake City species in the same beds as supposedly diagnostic Avon Park species in the outcropping middle Eocene of Cuba. The Avon Park was originally defined by Applin and Applin (1944) as extending from the highest occurrence of *Coskinolina floridana* Cole downward to the top of *Dictyoconus americanus*. As Applin and Applin (1944, p. 1687), recognized, however, that *Coskinolina floridana* is abundant in the Oligocene Suwannee Limestone in many places.

The so-called Avon Park and Lake City Limestones cannot be distinguished from each other on the basis of either lithology or fauna, except locally. Therefore, it is here proposed that the term "Lake City" be abandoned and that all of the cream to brown pelletal limestone and interbedded brown to cream dolomite of middle Eocene age in peninsular Florida and southern Georgia be placed in the Avon Park Formation. The term "Avon Park" is retained because (1) it has precedence over the term "Lake City," (although both the Avon Park and the Lake City were named in the same report by Applin and Applin (1944), the Avon Park was described on an earlier page in that paper) and (2) the term has traditionally been applied to rocks whose lithology is different from that of the overlying Ocala Limestone. The Avon Park is more properly called a "formation" rather than a "limestone" because it contains appreciable amounts of rock types other than limestone. The extended definition of the Avon Park Formation proposed here refers to the sequence of predominately brown limestones and dolomites of various textures that lies between the gray, largely micritic limestones and gray dolomites of the Oldsmar Formation and the white foraminiferal coquina or fossiliferous micrite of the Ocala Limestone.

The reference section proposed for the extended Avon Park Formation is the interval from 221 to 1,190 ft below land surface in the Coastal Petroleum Company's No. 1 Ragland well in sec. 16, T. 15 S., R. 13 E., in Levy County, Fla. Cuttings from this well are on file at the Florida Bureau of Geology, Tallahassee, Fla., as well W-1537 or permit number 66. The well is numbered FLA-LV-4 in this report. A lithologic description of the cuttings from the proposed type well is given in the Appendix of this report. The top of the Avon Park is not known in the type well because there is a gap in the cuttings from the basal Ocala at a depth of 110 ft to the uppermost Avon Park sample at 221 ft. Figure 5 shows a representative electric log pattern for the Avon Park Formation (extended) in a nearby well in Levy County, Humble's No. 1 C. E. Robinson (well FLA-LV-5 of this report).

Fauna considered characteristic of the revised Avon Park Formation include the Foraminifera *Spirolina coreyensis* (Cole), *Lituonella floridana* (Cole), *Discorbis inornatus* Cole, *Valvulina cushmani* Applin and Jordan, *V. martii* Cushman and Bermudez, *Fabularia vaughani* Cole and Ponton, *Textularia coreyensis* Cole, *Gunteria floridana* Cushman and Ponton, *Pseudorbitolina cubensis* Cushman and Bermudez, *Amphistegina lopeztrigoni* Palmer, and *Lepidocyclina antillea* Cushman (formerly called *L. gardnerae* Cole). Fragments of the alga *Clypeina infundibuliformia* Morellet and Morellet are also considered characteristic of the Avon Park.

To the north and west, the Avon Park Formation grades into an argillaceous, soft to semi-indurated, micritic, glauconitic limestone that in turn grades updip into calcareous, glauconitic, often shelly sand and clay beds that are parts of the Lisbon and Tallahatta Formations. The middle third of the revised Avon Park Formation in the eastern half of the Florida peninsula and in much of southeastern Georgia is micritic, low-permeability, finely pelletal limestone. Approximately the lower half of the extended Avon Park in west-central peninsular Florida consists of low-permeability dark-colored gypsiferous limestone and dolomite. Both the micritic limestone and the gypsiferous carbonate beds comprise important subregional confining units within the Floridan aquifer system.

Tallahatta Formation—Where the Tallahatta Formation crops out in western Alabama, it consists largely of greenish-gray, porous, fine-grained siliceous claystone (called buhrstone in older reports) and some interbedded sands that are calcareous and fossiliferous near the top of the unit. In eastern Alabama, the outcropping Tallahatta is mostly poorly sorted, occasionally gravelly sand interbedded with greenish-gray clay and calcareous sand near the top. In southwestern Georgia, the outcropping Tallahatta is somewhat more marine than it is in Alabama and consists of fine- to coarse-grained slightly fossiliferous sand interbedded with dark-brown, silty, micaceous, occasionally glauconitic limestone. Chert is common near the base of the Tallahatta in updip areas in Georgia.

Downdip, in both Alabama and Georgia, the Tallahatta consists largely of interbedded gray to greenish-gray glauconitic sand and greenish-gray to brownish-gray shale; light- to dark-brown glauconitic fossiliferous limestone is common. Farther seaward in Georgia, the Tallahatta grades into cream to light-gray glauconitic, argillaceous, somewhat sandy limestone that in turn grades into the revised Avon Park Formation. Along and just to the north of the Gulf Coast of Alabama and western panhandle Florida, the Tallahatta consists mostly of gray to greenish-gray clay and thin to moderately thick interbeds of fine-grained, glauconitic, calcareous sand. Neither the limestone facies nor the calcareous clay and sand of western Florida and southern Alabama can be distinguished from similar overlying strata that are considered to be the Lisbon Formation in this study. In northeastern Georgia, the Tallahatta is mostly gray, calcareous, fossiliferous clay and has a thin sequence of calcareous sand and glauconitic limestone at the base. These strata grade northeastward into calcareous shelly sand

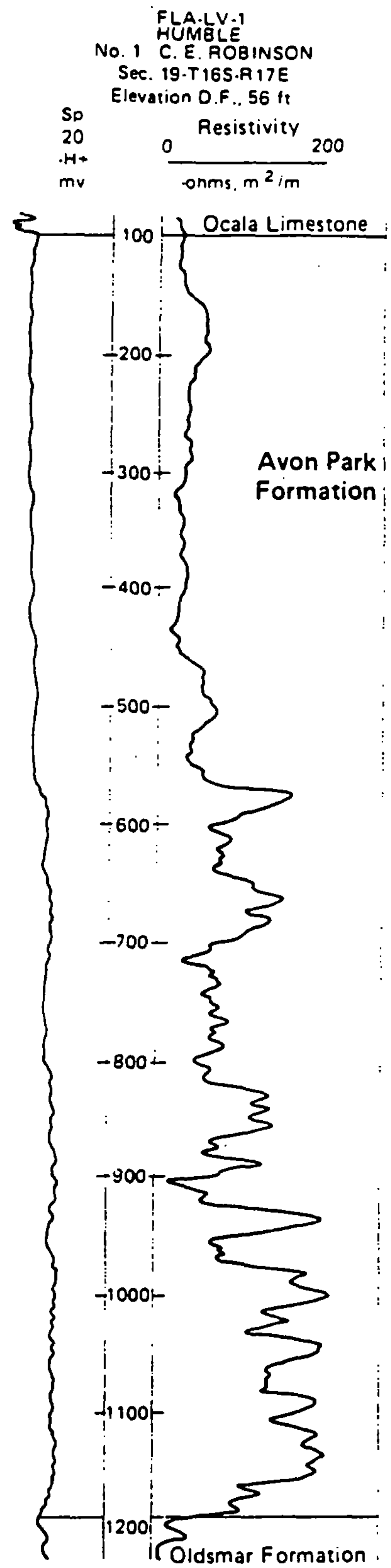

Figure 5. Representative electric log pattern for the Avon Park Formation.

sists of carbonate rocks throughout all of the study area except for southwestern Alabama, western panhandle Florida, and parts of northeastern Georgia and southwestern South Carolina, where clastic strata make up an important part of the Oligocene. The few scattered outliers of Oligocene lying between the two main bodies shown on plate 10, indicate that these rocks extended over a much wider area before being removed by erosion. Older rocks are exposed at scattered places within the widespread but generally thin body of the Oligocene in Georgia, where erosion has removed all of the Oligocene locally. The locations of most of the Oligocene outliers and the places where Oligocene rocks have been stripped are based on well data compiled for this study. A few of these features, however, are located from published sources, and thus lie in places where no well control is shown on plate 10. Erosional remnants to the north and west of the general updip limit of the Oligocene show that these rocks once extended over a much wider area.

Both large- and small-scale structural features affect the configuration of the Oligocene top. Large-scale features include (pl. 10) (1) the steep gulfward slope of the unit in southwestern Alabama, which reflects subsidence of the Gulf Coast geosyncline, (2) the low area in southern Gulf County, Fla., that represents the Southwest Georgia embayment, (3) the negative area in Glynn County, Ga., and adjacent counties that is the Southeast Georgia embayment, and (4) a low area in southwestern peninsular Florida that may represent a remnant of the South Florida basin. The northwest-southeast orientation of the axis of the South Florida basin is different from its alinement on the surface of older rock units (compare, for example, pls. 8 and 10). The high area shown on the Oligocene surface along the Gulf of Mexico parallel to the South Florida basin is not present on the upper Eocene top. This high probably acted as a sill or barrier during Oligocene time and partly restricted open circulation between the South Florida basin and the ocean. Smaller structural features shown on plate 10 include the northeast-trending series of small grabens in central Georgia that are collectively called the Gulf Trough and a coast-parallel normal fault that extends from Indian River County southeast through Martin County, Fla. The Oligocene has been eroded from the upthrown side of this fault but is preserved on its downthrown side.

The Oligocene top slopes generally seaward from a high of more than 300 ft above sea level in the unit's outcrop area in central Georgia to slightly more than 600 ft below sea level in both the Southwest and Southeast Georgia embayments. This general seaward slope is interrupted in northern Florida by a high area extending from Leon County eastward to Columbia County, where Oligocene rocks crop out. From a second outcrop area that extends southward from Citrus to Hillsborough Counties, Fla., Oligocene rocks slope into the South Florida basin, where the Oligocene top is more than 900 ft below sea level. The maximum measured depth to the top of the Oligocene is about 2,680 ft below sea level in well ALA-BAL-30 in southern Baldwin County, Ala. The maximum contoured depth is below 3,200 ft, to the southwest of this well. Although the top of the Oligocene is affected locally by erosion and karst topography, it is not as irregular as the top of upper Eocene strata.

The thickness of the Oligocene Series is shown on plate 11. Most of the contouring shown on this plate is based on well data. Where wells are scattered, the thickness of Oligocene rocks has been estimated by subtracting contours that represent the tops of upper Eocene and Oligocene rocks (pls. 8 and 10). Oligocene strata are generally less than 200 ft thick in the study area. Exceptions are southwestern Florida, where these rocks are more than 400 ft thick; southern Gulf and Franklin Counties, Fla., where they are more than 600 ft thick; and the southernmost part of Alabama, where they are more than 800 ft thick. These thick areas represent the South Florida basin, the Southwest Georgia embayment, and the northeastern rim of the Gulf Coast geosyncline, respectively. Throughout most of eastern Georgia and all of South Carolina, the thickness of the Oligocene Series only locally exceeds 100 ft and is generally 50 ft or less.

SUWANNEE LIMESTONE AND EQUIVALENT ROCKS

The name "Suwannee Limestone" was proposed by Cooke and Mansfield (1936, p. 71) for "yellowish limestone typically exposed along the Suwannee River in Florida, from Ellaville...almost to White Springs...." They considered these beds to be of Oligocene (Vicksburgian) age rather than Miocene as previous investigators had postulated. Cores and well cuttings examined during this study show that the Suwannee usually consists of two rock types: (1) cream to tan, crystalline, highly vuggy limestone containing prominent gastropod and pelecypod casts and molds and (2) white to cream, finely pelletal limestone containing small foraminifers and pellets of micrite bound by a micritic to finely crystalline limestone matrix. Although these two rock types are complexly interbedded in places, the pelecypod cast-and-mold limestone is more characteristic of the upper part of the Suwannee and is the lithology most representative of the entire formation in most of Georgia and eastern panhandle Florida. The micritic pelletal limestone that is characteristic of the lower part of the Suwannee is locally

found higher in the formation in southwestern Florida. Because the Suwannee, like the Ocala, cannot be divided everywhere, the two facies have not been delineated in this report.

The upper part of the Suwannee has been locally silicified, and this chert-rich horizon was named the Flint River Formation in Georgia. These silicified beds are rarely found in the subsurface and appear to merely represent local diagenetic conditions rather than a widespread mappable variation within the Suwannee. The term Flint River is accordingly not considered to be a valid formational name in this report.

The upper part of the Suwannee in the Georgia subsurface commonly consists of medium to coarsely crystalline, light-brown to honey-colored, saccharoidal, vuggy dolomite. The erosional remnants of Suwannee preserved as outliers several miles distant from the main bodies of Oligocene rocks (pl. 10) and consisting of either limestone or dolomite show that marine Oligocene strata once covered the entire study area. Locally, the cast-and-mold facies of the Suwannee contains fine-grained sand. Very locally, the micritic pelletal facies contains trace amounts of fine- to medium-grained, light- to dark-brown phosphate. In outcrop, the Suwannee locally weathers to a nodular, rubbly surface owing to the removal of layers, lenses, and stringers of soft argillaceous limestone.

The Suwannee grades northward in northeastern Georgia and South Carolina into part of the Cooper Formation by the addition of clay and sand and the loss of limestone. Westward, across panhandle Florida and southern Alabama, the Suwannee appears to grade into the lower part of the Bucatunna Formation. In that area, the Suwannee consists of tan limestone, dolomitic limestone, and light-colored calcareous clay. Some of these beds were called "Byram" or "Glendon" by early workers (Cooke and Mossum, 1929; Cooke, 1945) primarily on the basis of their stratigraphic position. Some faunal aspects of the Suwannee in Florida are Chickasawhayan (late Oligocene); others are Vicksburgian (early Oligocene). The unit is thus interpreted in this report as spanning both ages (pl. 2). The Suwannee in Georgia is thought to be late Oligocene (Huddlestun, 1981).

Microfauna considered characteristic of the Suwannee include the larger Foraminifera *Lepidocyclina leonensis* Cole and *L. parvula* Cole as well as the small Foraminifera *Pararotalia byramensis* Cushman and *P. mexicana mecatepecensis* Nutall, which are closely related. Although the genus *Miogypsina* ranges into younger strata in the central Gulf Coast, it does not occur above the top of the Suwannee in the study area. The larger Foraminifera *Discorinopsis gunteri* Cole, *Dictyoconus cookei* (Moberg), and *Coscinolina floridana* Cole are commonly found in the Suwannee, but these three species are also found lower in the section in the middle Eocene Avon Park Formation. Some authors think that these species have been reworked from the Avon Park into the Suwannee. Others think that they are merely long-ranging species that are "facies seekers." That is, their reappearance in the Suwannee means nothing more than the reestablishment of environmental conditions like those in which the Avon Park was deposited. Most individuals of these three species from the Suwannee examined during this study appeared fresh and unaltered, and the species are widespread throughout the cast-and-mold facies of the formation. In addition, there is no apparent Avon Park source from which these fossils could have been reworked. The isolated patches of Avon Park that are exposed through a cover of upper Eocene sediments (pl. 8) are too small and too scattered to provide a source from which these widely distributed Foraminifera could have been reworked into the Suwannee. This author therefore believes that these are long-ranging species indigenous to the Suwannee Limestone.

Bumpnose, Red Bluff, and Forest Hill Formations

In panhandle Florida, the Oligocene Series thickens considerably (pl. 11) and becomes increasingly clastic westward. In addition, some carbonate units that are older than the Suwannee are present at the base of the Oligocene (pl. 2). One such unit is the Bumpnose Formation, a name applied by Moore (1955) to a soft, white, somewhat glauconitic, highly fossiliferous (pelecypod and gastropod casts and molds and bryozoan and foraminiferal remains) limestone that crops out in central Jackson County, Fla. Moore thought that the Bumpnose represented the uppermost part of the late Eocene but recognized that many of its faunal elements were Oligocene. Subsequent work by Hazel and others (1980) confirmed the findings of MacNeil (1944) and Cooke (quoted by Moore, 1955, p. 38) that the beds that Moore called Bumpnose correlate with the Red Bluff Formation of Alabama of known Oligocene age. The Bumpnose in its type area is very likely a transitional unit between the late Eocene and early Oligocene. The Bumpnose Formation, however, is placed in the Oligocene in this report because carbonate rocks in western Alabama that are in the same stratigraphic position as the Bumpnose and that can be shown to correlate with it are of Oligocene age (Hazel and others, 1980).

The Bumpnose grades northwestward into the Red Bluff Formation, which is mostly dark-gray to brown, fossiliferous, glauconitic clay that contains some iron-

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UPPER CONFINING UNIT

Over much of the study area, the Floridan aquifer system is overlain by an upper confining unit that consists mostly of clastic rocks but locally contains much low-permeability limestone and dolomite in its lower parts. In places, the upper confining unit has been removed by erosion, and the Floridan either crops out or is covered by only a thin veneer of permeable sand that is part of the surficial aquifer. Because the lithology and thickness of the upper confining unit are highly variable, the unit retards the vertical movement of water between the surficial aquifer and the Floridan aquifer system in varying degrees. Where the upper confining unit is thick or where it contains much clay, leakance through the unit is much less than where it is thin or highly sandy. In these thick or clay-rich areas, therefore, water in the surficial aquifer moves mostly laterally and is discharged into surface-water bodies rather than moving downward through the upper confining unit (when the head differential is favorable) to recharge the Floridan aquifer system.

The upper confining unit may be breached locally by sinkholes and other openings that serve to connect the Floridan aquifer system directly with the surface. These sinkholes are for the most part found where the thickness of the upper confining unit is 100 ft or less. They appear to result from the collapse of a relatively thin cover of clastic materials into solution features developed in the underlying limestone of the Floridan aquifer system rather than from the solution of limestone beds within the upper confining unit itself. The upper confining unit is generally more sandy where it is less than 100 ft thick because these relatively thin areas represent upbasin depositional sites where coarser clastic rocks were laid down. Plate 25 shows the extent and thickness of the upper confining unit. The maximum measured thickness of the unit is about 1,890 ft in well ALA-BAL-30 in Baldwin County, Ala. The maximum contoured thickness is 1,900 ft. Plate 25 also shows areas where water in the Floridan aquifer system occurs under unconfined, thinly confined (thickness of upper confining unit between 0 and 100 ft), and confined conditions.

The upper confining unit includes all beds of late and middle Miocene age, where such beds are present. Locally, low-permeability beds of post-Miocene age are part of the upper confining unit. Over most of the study area, middle Miocene and younger strata consist of complexly interbedded, locally highly phosphatic sand, clay, and sandy clay beds, all of which are of low permeability in comparison with the underlying limestone of the Floridan aquifer system. Locally, low-permeability carbonate rocks that are part of the lower Miocene Tampa Limestone or of the Oligocene Suwannee Limestone are included in the upper confining unit. Very locally, in the West Palm Beach, Fla., area, the uppermost beds of rocks of late Eocene age are of low permeability and are included in the upper confining unit.

Parker and others (1955) and Stringfield (1966) included basal beds of the Hawthorn Formation in their Floridan and principal artesian aquifers where those beds are permeable. In a few isolated cases (for example, in Brevard County, Fla.), the lowermost Hawthorn strata are indeed somewhat permeable, but their permeability is considerably less than that of the underlying Floridan aquifer system, as Parker and others (1955, p. 84) recognized. Locally, in parts of southwestern Florida (Sutcliffe, 1975; Boggess and O'Donnell, 1982) and west-central peninsular Florida (Ryder, 1982), permeable zones within the Hawthorn Formation are an important source of ground water over a one- or two-county area. Although some of these permeable zones are limestones, their transmissivity is at least an order of magnitude less than that of the Floridan aquifer system, and they are separated from the main body of permeable limestone (Floridan) by thick confining beds. Because of their limited areal extent, relatively low permeability, and vertical separation from the Floridan aquifer system practically everywhere, water-bearing Hawthorn limestones are excluded from the Floridan in this report.

Where the limestone and dolomite of the Floridan crop out, a clayey residuum may form over the carbonate rocks as a result of chemical weathering that dissolves the carbonate minerals and concentrates trace amounts of clay that are in them. Such residumm is particularly well developed in the Dougherty Plain area of southwestern Georgia (Hayes and others, 1983). Although this residuum is a low-permeability material and may very locally form a semiconfining layer above the limestone, it is usually thin and laterally discontinuous. Accordingly, the clayey residuum is not included in this report as part of the upper confining unit of the Floridan aquifer system.

Because the rocks that comprise the upper confining unit vary greatly in lithology, are complexly interbedded, and for the most part are of low permeability, little is known about their hydraulic characteristics. Where clay beds are found in the Hawthorn Formation, they are usually very effective confining beds. Vertical hydraulic conductivity values for Hawthorn clays, as established from core analysis and from aquifer tests, range from 1.5×10^{-2} ft/d (Hayes, 1979) to 7.8×10^{-7} ft/d (Miller and others, 1978). Where sandy beds of the Hawthorn comprise a local aquifer, transmissivity values for the sand range as high as

REFERENCE 19

Southwest Florida Water Managemen[t]

2379 Broad Street (U.S. 41 South) Brooksville, Fl[a]
Phone (904) 796-7211 or 1-800-423-1476 SUNCOM 628-4150

September 27, 1990

Ms. Maureen M. Gordon
NUS, Corporation
1927 Lakeside Pkwy., Suite 614
Tucker, Georgia 30084

SUBJECT: Well Construction Permit Listing

Dear Ms. Gordon

Enclosed you will find copies of the above referenced listing for the areas outlined in your letter dated September 6, 1990.

If I can be of any further assistance, please contact this office.

Sincerely,

JAMES P. MARSHALL
Well Construction
Permit Coordinator

/JPM

NUS
CORPORATION

1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404-938-7710

C-586-9-0-55

September 6, 1990

Mr. Jim Marshal
2379 Brood Street
Brooksville, FL 34609-6899

Dear Mr. Marshal:

I am doing a site investigation of AMAX Phosphate Facility (Royster) in Palmetto for Superfund. Could you please send me a listing of all wells (private, municipal, industrial) within a 4-mile radius. The latitude of the site is 27°37'24" and the longitude, 82°31'54' The following is a listing of Sections, Townships, and Ranges included in the 4-mile radius:

Sections 13-36, Township 32S, Range 18E
Sections 1-36, Township 33S, Range 18E
Sections 1, 12, 13, 23-27, 34, 35, Township 33S, Range 17E

Very truly yours,

Maureen Gordon

Maureen M. Gordon, Ph.D.
Project Manager

Approved:

MMG/tb

DATE 9/27/90 5:02:12 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT PAGE I

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	B NA BG RS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
321842	H	1336	B	11	057	0 0	133218	3	52	206	N	0	C	6					000000		NO	WM CLARK
360809	C	1336	B	11	057	4 1	133218	3	62	215	Y	6	C	0					000000		NO	WHISMAN, CLIFFORD F.
351555	E	1477	B	11	057	0 0	133218	4	230	230	N	0	C	0					000000		NO	MORGAN, VERNON
416627	I	2251	D	11	057	0 0	133218	2	147	242	Y	8	R	0						0000	NO	CRISSEY, FLORENCE
307762	E	0000	D	11	057	1 1	133218	3	53	213		0	C	7					000000		NO	M H SUMNER
320752	F	0000	D	11	057	4 1	133218	3	77	242		0	C	6					000000		NO	LEON LIMOGE
323223	E	1336	D	11	057	0 0	133218	3	87	200		0	C	10					000000		NO	F DIAZ
326929	E	1477	D	11	057	0 0	133218	3	36	210		0	C	12					000000		NO	L DAVIS
326930	E	1477	D	11	057	0 0	133218	3	148	205		0	C	12					000000		NO	D L GIBSON
332982	E	1160	D	11	057	0 0	133218	3	53	187		0	C	12					000000		NO	D SIMPSON
333553	H	1336	D	11	057	0 0	133218	3	58	212		0	C	7					000000		NO	DEBLY J D
338943	E	1160	D	11	057	0 0	133218	3	63	185		0	C	1					000000		NO	COOK,R L
338944	E	1160	D	11	057	0 0	133218	3	59	180		0	C	1					000000		NO	WALKER,D I
376125	C	1336	D	11	057	1 4	133218	3	70	200	N	0	C	0					000000		NO	CROWDER, CHARLES H.
397715	C	1336	D	11	057	0 0	133218	3	64	210	N	0	C	0					000000		NO	HERBECK, HOWARD
398928	C	1336	D	11	057	1 4	133218	3	67	210	N	0	C	0					000000		NO	BMUINSMA, THYS
400476	C	1336	D	11	057	4 1	133218	3	67	210	N	0	C	10					000000		NO	KOJIS, GEORGE
406371	F	1336	D	11	057	1 4	133218	3	84	210	N	0	C	0					000000		NO	WHITMAN,JERRY
332778	E	1627	D	11	057	0 0	133218	4	54	115		0	C	3	A	K	C	H	000000		NO	B RUSH
336250	E	1094	D	11	057	0 0	133218	4	105	183		0	R	0					000000		NO	HOWARD J
439683	I	1477	D	11	057	4 2	133218	4	63	200		0	C	18						0023	NO	DRIGGERS, MARGARET
475153	I	1336	D	11	057	0 0	133218	4	84	220		0	C	5						0000	NO	DANIELS, DAVID
499395	I	2088	D	11	057	0 0	133218	4	39	185		0	C	0						0000	NO	NETTGEN, ELMER
503174	I	1477	H	11	057	4 4	133218	3														GIBSON, W. W.
433885	I	2858	0	11	057	1 4	133218	2	2	12	N	0	A	0						0000	NO	PAYLESS OIL
433886	I	2858	0	11	057	1 4	133218	2	2	12	N	0	A	0						0000	NO	PAYLESS OIL
433887	I	2858	0	11	057	1 4	133218	2	2	12	N	0	A	0						0000	NO	PAYLESS OIL
433888	I	2858	0	11	057	1 4	133218	2	2	12	N	0	A	0						0000	NO	PAYLESS OIL
444245	I	2587	0	11	057	0 0	133218	2	2	12		0	A	4						0000	NO	HANDY FOOD STORES
444246	I	2587	0	11	057	0 0	133218	2	2	12		0	A	4						0000	NO	HANDY FOOD STORES
444247	I	2587	0	11	057	0 0	133218	2	2	12		0	A	4						0000	NO	HANDY FOOD STORES
444248	I	2587	0	11	057	0 0	133218	2	2	12		0	A	4						0000	NO	HANDY FOOD STORES
332091	E	1477	A	11	057	0 0	143218	6	63	571		0	C	1					000000		NO	RAINBOW FLO
442683	I	1336	A	11	057	3 1	143218	6	55	525	N	0	C	20						0000	NO	CONSTANTINE TRUST, T. J.
383721	C	1057	A	11	057	4 4	143218	8	63	325	N	0	C	4					000000		NO	ELSBERRY BROTHERS INC.
406419	E	2088	A	11	057	0 0	143218	10	80	780	Y	0	R	2					000000		NO	CARLTON, C DENNIS
420163	I	1336	B	11	057	0 0	143218	3	70	200	Y	6	C	0						0000	NO	RAINBOW FLOWERS INC.
339076	H	1477	B	11	057	0 0	143218	4	63	201	Y	2	C	6					000000		NO	RAINBOW FLW
308998	E	0000	D	11	057	0 0	143218	3	40	130		0	C	0					000000		NO	P MOSS

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
406372	E	1336	D	11	057	1 4	143218	3	65	220	N	0	C	0					000000		NO	MITUSINA,MIRO
338801	E	1056	D	11	057	0 0	143218	4	81	195		0	C	0					000000		NO	ALLSTATE HM
370638	C	1056	D	11	057	4 4	143218	4	40	190		0	C	0					C00000		NO	ALLSTATE HOMES
389709	C	1043	D	11	057	0 0	143216	4	84	210	N	0	T	0					000000		NO	ESPER, RICHARD
484433	I	2088	D	11	057	0 0	143218	4	84	323		0	C	10						0000	NO	WINDGATE, BUD
331899	E	1477	I	11	057	0 0	143218	3	44	176		0	C	0					000000		NO	RAINBOW FLO
497764	I	2898	0	11	057	1 1	143218	2	10	15	Y	3	A	0						0000	NO	LEISCY SHELL CORP.
311162	E	0000	D	11	057	3 4	153218	3	37	170		0	C	0					000000		NO	B PATE
386567	C	2088	D	11	057	0 0	153218	4	72	190	N	0	C	1					000000		NO	REMKE DEVELOPMENT
415394	I	1974	0	11	057	0 0	153218	2	20	30	Y	2	R	0						0001	NO	LEISEX SHELL PIT
415395	I	1974	0	11	057	0 0	153218	2	20	30	Y	2	R	3						0002	NO	LEISEX SHELL PIT
430969	I	1974	0	11	057	0 0	153218	2	20	30	Y	3	R	0						000C	NO	SHELL, LEISEY
473606	I	2587	0	11	057	0 0	153218	2	10	10	Y	1	A	5						0000	NO	LEISEY SHELL PIT
473607	I	2587	0	11	057	0 0	153218	2	10	10	Y	1	A	5						0000	NO	LEISEY SHELL PIT
473608	I	2587	0	11	057	0 0	153218	2	10	10	Y	1	A	5						0000	NO	LEISEY SHELL PIT
473609	I	2587	0	11	057	0 0	153218	2	10	10	Y	1	A	5						0000	NO	LEISEY SHELL PIT
476132	I	2898	0	11	057	4 2	153218	2	25	25	Y	2	A	12						0000	NO	LEISEY SHELL PIT
476133	I	2898	0	11	057	0 0	153218	2	25	25	Y	2	A	4						0000	NO	LEISEY SHELL PIT
476134	I	2898	0	11	057	0 0	153218	2	25	25	Y	2	A	4						0000	NO	LEISEY SHELL PIT
485125	I	2898	0	11	057	2 2	153218	2	5	25	Y	2	R	0						0000	NO	LEISEY SHELL PIT
485127	I	2898	0	11	057	2 1	153218	2	4	25	Y	2	A	0						0000	NO	LEISEY SHELL PIT
415401	I	1974	Y	11	057	0 0	153218	2	194	194	Y	12	R	0						0000	NO	LEISEX SHELL PIT
375491	C	2251	Y	11	057	0 0	153218	3	0	0	Y	18		0					C00000		NO	HILLSBOROUGH CO PURCHASING DEPT
375492	C	2251	Y	11	057	0 0	153218	3	0	0	Y	15		0					C00000		NO	HILLSBOROUGH CO PURCHASING DEPT
375493	C	2251	Y	11	057	0 0	153218	3	0	0	Y	22		0					000000		NO	HILLSBOROUGH CO PURCHASING DEPT
415400	I	1974	Y	11	057	0 0	153218	3	172	172	Y	34	R	0						0000	NO	LEISEX SHELL PIT
491166	I	2898	Y	11	057	3 2	153218	3	25	25	Y	4	R	0						0000	NO	WING, WALTER
491167	I	2898	Y	11	057	3 2	153218	3	0	99	Y	10	R	0						C000	NO	WING, WALTER
415399	I	1974	Y	11	057	0 0	153218	6	458	458	Y	10	R	0						C000	NO	LEISEX SHELL PIT
417346	I	1974	Y	11	057	0 0	153218	6	0	420	Y	9	R	0						C000	NO	LEISEY SHELL PIT
417347	I	1974	Y	11	057	0 0	153218	6	0	394	Y	56	R	0						0000	NO	LEISEY SHELL PIT
417710	I	1974	Y	11	057	0 0	153218	6	446	446	Y	3	R	0						0000	NO	LEISEY SHELL PIT
478329	I	2898	Y	11	057	0 0	153218	6	0	222	Y	25	R	0						0000	NO	W & W ENTERPRISES
485123	I	2896	Y	11	057	4 2	153218	6														LEISEY SHELL PIT
415396	I	1974	Y	11	057	0 0	153218	8	363	383	Y	42	R	0						0000	NO	LEISEX SHELL PIT
415397	I	1974	Y	11	057	0 0	153218	8	179	179	Y	65	R	0						0000	NO	LEISEX SHELL PIT
415398	I	1974	Y	11	057	0 0	153218	8	204	204	Y	10	R	0						0000	NO	LEISEX SHELL PIT
417348	I	1974	Y	11	057	0 0	153218	8	388	388	Y	46	R	0						0000	NO	LEISEY SHELL PIT
427265	I	2405	D	11	057	2 2	163218	4	93	180		0	C	32						0000	NO	HAMMER HOMES

WELL CONSTRUCTION PERMITTING

RCB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOP	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
434980	I	1232	E	11	057	0 0	193218	6	40	125	Y	15	R	0						0000	NO	MESA CORROSION
349082	N	1509	0	11	057	0 0	213218	4	*** CANCELLED ***													CLAPROOD, VICTOR
338908	H	1336	B	11	057	0 0	223218	4	75	240	Y	5	C	4					000000		NO	HW IL MB PK
473352	I	9028	0	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473353	I	9028	0	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473355	I	9028	0	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473356	I	9028	0	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473357	I	9028	0	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473358	I	9028	0	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473359	N	9028	0	11	057	0 0	223218	2	*** CANCELLED ***													TODD, GEORGE K.SR.
473360	N	9028	0	11	057	0 0	223218	2	*** CANCELLED ***													TODD, GEORGE K.SR.
349083	N	1509	0	11	057	0 0	223218	6	*** CANCELLED ***													CLAPROOD, VICTOR
349084	N	1509	0	11	057	0 0	223218	8	*** CANCELLED ***													CLAPROOD, VICTOR
413661	E	2502	Y	11	057	0 0	223218	6	26	183		0	R	0					11-207		NO	WILDER CORPORATION OF DELAWARE
458905	I	2088	A	11	057	0 0	233218	4	63	320		0	C	0						0000	NO	TODD, GEORGE
310333	E	0000	A	11	057	1 3	233218	8	159	625		0	C	0					000000		NO	LIESY TODD
323268	H	1336	B	11	057	2 4	233218	4	80	225	N	0	C	25					000000		NO	G TINDALE
337776	H	1160	B	11	057	0 0	233218	4	80	267	Y	9	C	18					000000		NO	SPEEDLINE
353451	C	1094	D	11	057	0 0	233218	2	189	242		0	R	28					000000		NO	YORK, C.
362923	C	1094	D	11	057	0 0	233218	2	126	301		0	R	0					000000		NO	GARNER, MARCUS L.
370069	C	1094	D	11	057	0 0	233218	2	107	253		0	R	14					000000		NO	HOBART, RENA
375122	C	2250	D	11	057	0 0	233218	2	109	232	Y	5	R	0					LOT-24		NO	RODRIGUEZ, MR.
375162	N	2250	D	11	057	0 0	233218	2	*** CANCELLED ***													FOSTER, JOHN
376395	C	2250	D	16	057	0 0	233218	2	106	262	Y	6	R	0					LOT-18		NO	BLANCHARD
377087	C	2250	D	14	057	0 0	233218	2	108	240	Y	6	R	0					LOT-13		NO	CHRISTIE, GREG
378401	C	2250	D	11	057	0 0	233218	2	109	232	Y	5	R	0					LOT-12		NO	BABBITT, IVAN
378888	C	2250	D	11	057	0 0	233218	2	110	242	Y	5	R	0					LOT-17		NO	SYNDER, ROBERT
379159	C	2250	D	11	057	0 0	233216	2	110	258	Y	0	R	0					LOT-20		NO	TOWER
380246	C	2250	D	11	057	0 0	233218	2	111	262	Y	5	R	0					LOT-22		NO	BETTY, MR.
380247	C	2250	D	11	057	0 0	233218	2	108	218	Y	5	R	0					LOT-18		NO	FORD, MR.
380248	C	2250	D	11	057	0 0	233218	2	107	232	Y	5	R	0					LOT-10		NO	NORELSKI, MR.
380323	C	2250	D	11	057	0 0	233218	2	208	238	Y	15	R	0					LOT-20		NO	ROCHON, CONRAD
383519	C	2251	D	11	057	0 0	233218	2	130	232	N	6	R	0					000		NO	STEINBANG, GERALD
386162	C	2251	D	11	057	0 0	233218	2	112	232	Y	5	R	0					LOT 14		NO	GAMBRELL, HERMAN H.
3864[illegible]9	C	2251	D	11	057	0 0	233218	2	105	232	Y	5	R	0					LOT 17		NO	MACKENZIE, THERESA
393244	C	2250	D	11	057	0 0	233218	2	123	292	Y	5	R	0					LOT 22		NO	THARP, JOHN W
432318	I	1336	D	11	057	2 3	233218	3	90	125		0	C	15						0000	NO	NIXON, PRISCILLA
372431	C	1094	D	11	057	0 0	233218	4	100	235		0	R	17					000000		NO	HOBART, RENA
372517	C	1094	D	11	057	0 0	233218	4	101	243		0	R	0					LOT-25		NO	BLANCHARD

WELL CONSTRUCTION PERMITTING

ROB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	B NA BG RS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
372518	C	1094	D	11	057	0 0	233218	4	101	280		0	R	0					000000		NO	KAKIKA, MR.
372519	C	1094	D	11	057	0 0	233218	4	100	263		0	R	0					LOT-26		NO	BRICKER, MR.
372693	C	2250	D	11	057	0 0	233218	4	100	240		0	R	18					LOT-23		NO	TABER, EDWARD L.
372694	C	2250	D	11	057	0 0	233218	4	101	278		0	R	0					LOT-23		NO	BALABAS, LOUIS
372695	C	2250	D	11	057	0 0	233218	4	100	260		0	R	18					000000		NO	BAZAR, JERRY
373431	C	2250	D	11	057	0 0	233216	4	113	258	Y	7	R	20					000000		NO	LAMANO, RICHARD
373432	C	2250	D	11	057	0 0	233218	4	107	220	Y	6	R	15					000000		NO	TRIMMER, HOWARD
373433	C	2250	D	11	057	0 0	233218	4	106	212	Y	6	R	15					000000		NO	DOWNS, JACK
374138	C	2193	D	11	057	0 0	233218	4	74	356	N	0	C	14					000000		NO	SUN CITY GROVES
374163	C	2250	D	14	057	0 0	233216	4	105	236	Y	6	R	0					000000		NO	BOLLER, JOHN
374164	C	2250	D	14	057	0 0	233218	4	108	237	Y	7	R	26					000000		NO	VAUGH, CHARLES L.
378223	C	2088	D	11	057	0 0	233218	4	54	247	N	0	C	7					000000		NO	TODD JR., GEORGE
388970	E	1477	D	11	057	2 0	233218	4	240	240	N	0	C	0					000000		NO	TOOLE, R L
396802	C	2088	D	11	057	0 0	233218	4	84	194	N	0	C	22					000000		NO	ALTMAN, JAY C
406676	E	1477	D	11	057	2 3	233218	4	97	230	N	0	C	0					LOT A		NO	JONES, MARSHALL B
427847	I	2088	D	11	057	0 0	233218	4	63	250	Y	8	C	230						0000	NO	SIMMONS, MABEL
426494	I	2858	0	11	057	0 0	233218	2	2	12	Y	1	A	3					MW-1	0000	NO	PETROLEUM PRODUCTS SERVICE
426495	I	2858	0	11	057	0 0	233218	2	2	12	Y	1	A	3					MW-2	0000	NO	PETROLEUM PRODUCTS SERVICE
426496	I	2858	0	11	057	0 0	233218	2	2	12	Y	1	A	3					MW-3	0000	NO	PETROLEUM PRODUCTS SERVICE
426497	I	2858	0	11	057	0 0	233218	2	2	12	Y	1	A	3					MW-4	0000	NO	PETROLEUM PRODUCTS SERVICE
432837	I	2923	0	11	057	3 3	233218	2	15	15	Y	1	A	12					MW-1	0000	NO	SPEEDLING INC.
432838	I	2923	0	11	057	3 3	233218	2	15	15	Y	1	A	12					MW-2	0000	NO	SPEEDLING INC.
432839	I	2923	0	11	057	3 3	233218	2	15	15	Y	1	A	12					MW-3	0000	NO	SPEEDLING INC.
339065	H	1336	B	11	057	0 0	243218	3	107	223	Y	4	C	12					000000		NO	WIL MOB HMS
493374	I	1627	B	13	057	0 0	243218	5														BRATE, JAMES E
315498	H	0000	B	11	057	1 4	243218	6	94	293	N	0	C	14					000000		NO	NETHERS
344366	H	1094	D	11	057	0 0	243218	2	126	232		0	R	8					000000		NO	HART,R
381581	C	2251	D	11	057	0 0	243218	2	124	222	Y	6	R	0					LOT-12		NO	OLDFIELD
381582	C	2251	D	11	057	0 0	243218	2	129	242	Y	6	R	0					LOT-11		NO	SEEGAR
381583	C	2251	D	11	057	0 0	243218	2	129	225	Y	6	R	0					LOT-10		NO	MOOREHOUSE
381584	C	2251	D	11	057	0 0	243218	2	140	232	Y	6	R	0					LOT-15		NO	LUCAS
381894	C	2251	D	11	057	0 0	243218	2	122	222	Y	5	R	0					LOT-13		NO	DANIEL, CHARLENE
393875	C	2250	D	11	057	0 0	243218	2	110	222	Y	6	R	0					LOT 17		NO	SANTANA, C
395449	C	2250	D	11	057	0 0	243218	2														YOUNG, WILLIAM J
395450	C	2250	D	11	057	0 0	243218	2	107	252	Y	7	R	0					LOT 19		NO	ASKEW, ROYCE
395926	C	2251	D	11	057	0 0	243218	2	105	252	Y	3	R	0					LOT 14		NO	MCFARLAND, KENT MARSHALL
310646	E	0000	D	11	057	0 0	243218	3	53	185		0	C	5					000000		NO	W D WELLS
377156	E	1477	D	11	057	0 0	243218	3	76	212	N	0	C	0					LOT-16		NO	RAMEY, BOBBY
384360	C	1336	D	11	057	2 4	243218	3	59	210	N	0	C	0					000000		NO	RODRIGUEZ, JOSE G.

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BNA HGRS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOP	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
386212	C	1336	D	11	057	2 4	243218	3	90	220	N	0	C	0					000000		NO	COMBS, HELEN F.
389662	C	1336	D	11	057	0 0	243218	3	92	216	N	0	C	22					000000		NO	BEATTIE, MARVIN
389663	C	1336	D	11	057	0 0	243218	3	74	230	N	0	C	22					000000		NO	BOYLER, EDWARD
421239	I	1336	D	11	057	3 1	243218	3	87	240		0	C	9						0000	NO	WALLACE, JOHNNY
378648	E	1477	D	11	057	0 0	243218	4	96	200	N	0	C	0					LOTBEC		NO	LARGE, FRANK
382852	C	2088	D	11	057	0 0	243218	4	67	250	N	0	C	18					000000		NO	THOMAS, PAUL
384713	E	1477	D	11	057	4 2	243218	4	96	220	N	0	C	0					LOT-14		NO	KLINGENSMITH, RLAPH L.
386968	C	2088	D	11	057	0 0	243218	4	94	245	N	0	C	13					000000		NO	LEE, MAX
388488	C	2088	D	11	057	0 0	243218	4	68	240	N	0	C	13					000000		NO	GOMEZ, FRANK
388752	C	2088	D	11	057	0 0	243218	4	78	205	N	0	C	10					000000		NO	SMITH, ED A
388753	C	2088	D	11	057	0 0	243218	4	83	200	N	0	C	5					000000		NO	SMITH, ED A
389270	C	2088	D	11	057	0 0	243218	4	74	200	N	0	C	16					000000		NO	SMITH, ED A
397110	C	2088	D	11	057	0 0	243218	4	83	203	N	0	C	0					000000		NO	CAVAZOS, PEDRO
401012	C	2088	D	11	057	0 0	243218	4	86	230	N	0	C	30					000000		NO	SMITH, ED
409590	E	1477	D	11	057	0 0	243218	4	66	220	N	0	C	0					L10611		NO	MARSELL, GERALD A & CAROLYN R
409591	E	1477	D	11	057	0 0	243218	4	98	250	N	0	C	0					LOT 23		NO	MARSELL, GERALD A & CAROLYN R
409927	E	2267	D	11	057	1 4	243218	4	81	345	N	0	R	8					000000		NO	B. W. ELSBERRY TOMATO FARM
411224	E	1336	D	11	057	2 4	243218	4	75	230	N	0	C	0					LOT 10		NO	MAGIEMA, JOSEPH
418501	I	2088	D	11	057	0 0	243218	4	63	275	N	0	C	5						0000	NO	SMITH, ED
420882	I	1477	D	11	057	0 0	243218	4	110	200		0	C	0						0005	NO	MARSELL,JERRY
421240	I	1336	D	11	057	2 1	243218	4	73	220		0	C	9						0000	NO	COLPEAN, DON
423673	I	1477	D	11	057	0 0	243218	4	120	220		0	C	0						0012	NO	MARSELL, JERRY
429163	I	1477	D	11	057	1 1	243218	4	80	180		0	C	0						0000	NO	DEPT OF TRANSPORTATION
429991	I	1477	D	11	057	1 1	243218	4	85	120		0	C	0						0018	NO	DEPT OF TRANSPORATION
432250	I	2088	D	11	057	0 0	243218	4	120	260		0	C	0						0000	NO	DITIOLT, LEON
433410	I	1477	D	11	057	3 1	243218	4	107	246		0	C	0						0000	NO	CARDOSO, HENRY
460523	I	1477	D	11	057	0 0	243218	4	112	235		0	C	18						0000	NO	WEAVER, DAVID
496158	I	2088	D	11	057	0 0	243218	4	84	320		0	C	20						0000	NO	REGIS, ARLEN
490699	I	1627	D	14	057	0 0	243218	5	122	178	Y	39	R	15						0000	NO	WEAVER, DAVID
326391	E	1336	D	11	057	0 0	243218	8	189	41[illegible]		0	C	17					000000		NO	H SCHAUBE
490810	I	1336	H	11	057	1 3	243218	3	100	210		0	C	20						0000	NO	RODRIGUEZ, JOSE G.
500894	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500895	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500896	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500897	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500898	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500899	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
502350	I	2825	0	11	057	0 0	243218	2	23	33		0	R	0						0000	NO	MOORINGS OF MANATEE
502353	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BGRS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
486178	I	1477	Y	11	057	2 4	243218	4	0	160	Y	12	R	0						0000	NO	WEAVER, DAVID
314709	E	0000	A	11	057	1 1	253218	4	73	351		0	C	10					000000		NO	J D STEPHEN
310992	E	0000	D	11	057	2 4	253218	3	60	230		0	C	1					000000		NO	S K MCPHERS
311087	E	0000	D	11	057	3 4	253218	3	77	230		0	C	0					000000		NO	LOUGHRIDGE
337727	E	1160	D	11	057	1 3	253218	3	52	190		0	C	22					000000		NO	CROCKETT,F
356620	C	2088	D	11	057	0 0	253218	3	63	240	N	0	C	12					000000		NO	FOLSOM, LINDA
339752	E	1056	D	11	057	0 0	253218	4	87	276		0	C	18					000000		NO	ALDERMAN,J
384663	C	2088	D	11	057	0 0	253218	4	91	240	N	0	C	12					L12-13		NO	MEEK, RICHARD
397425	C	2088	D	11	057	0 0	253218	4	82	226	N	0	C	30					000000		NO	STEINBERG, MAX
466270	I	2405	D	11	057	0 0	253218	4	99	225		0	C	0						0000	NO	W. W. CONST.
309438	E	0000	D	11	057	2 1	263218	3	68	242		0	C	6					000000		NO	J SEIFERT
325632	E	1336	D	11	057	0 0	263218	3	73	225		0	C	0					000000		NO	A DUDA & SO
413257	N	1376	A	11	057	0 0	273218	8	*** CANCELLED ***													WEISS, RUSSELL
325729	E	1336	D	11	057	0 0	273218	3	96	150		0	C	0					000000		NO	BEN ELLIS
502169	I	1336	D	11	057	2 2	273218	3														TODD, GEORGE
407705	E	1336	D	11	057	4 2	273218	4	1	150	N	0	C	0					000000		NO	TRABERT, FRED
374404	C	0001	T	14	057	0 0	283218	2	18	45	N	0	R	0					SM-39		NO	TAMPA ELECTRIC CO
407138	E	1376	D	11	057	0 0	303218	5	60	180	Y	20	R	20					000000		NO	LUCASS, ARTHUR S
448271	I	1376	D	21	081	0 0	313218	4	90	140		0	C	1						0000	NO	STIMSON, JOHN
469129	I	2088	D	11	057	0 0	313218	4	63	275		0	C	0						0000	NO	DUCHAINE, EDWARD
374341	C	0001	T	11	057	0 0	313218	2	24	30	N	0	R	0					TF1447		NO	TAMPA ELECTRIC CO
415367	I	1376	B	11	057	0 0	323218	4	80	165	Y	40	R	2						0000	NO	REEDER, J T
308919	E	0000	D	11	057	4 4	323218	3	94	205		0	R	30					000000		NO	D CONNELL
331726	E	1336	D	11	057	0 0	323218	3	72	125		0	C	9					000000		NO	M SACKS
375080	C	1376	D	11	057	0 0	323218	4	140	220	Y	8	R	80					000000		NO	GOSCHCOFF, VIRGIL
390445	C	2088	D	11	057	0 0	323218	4	63	230	N	0	C	14					000000		NO	SANTJER, J A
374405	C	0101	T	14	057	0 0	323218	2	6	13	N	0	R	0					000000		NO	TAMPA ELECTRIC CO
345026	H	1627		11	057	0 0	333218	4	82	320		0	T	5					000000		NO	DANTERUSSEL
320560	E	1376	A	11	057	0 0	333218	12	245	980		0	C	45					000000		NO	COUNCIL FAR
348620	C	1699	D	11	057	0 0	333218	4	60	120	N	0	C	0					000000		NO	C A OAKES CONST CO
353531	C	1627	B	11	057	1 3	333218	4	80	502	Y	0	T	21					000000		NO	KANOUFF, RALPH
385505	C	1627	B	11	057	0 0	333218	5	93	448	Y	26	R	10		M	C		000000		NO	GIGGLIOTTI PIPELINE
320867	E	0000	D	11	057	1 3	333218	4	74	400		0	C	11					000000		NO	F GREEN
347369	C	1699	D	11	057	0 0	333218	4	60	187		0	C	0					000000		NO	OAKS, C. A. CONSTRUCTION
405356	C	1627	D	11	057	0 0	333218	5	74	235	Y	18	R	18		M	B		000000		NO	POWELL
469041	N	2987	O	11	057	0 0	333218	2	*** CANCELLED ***													FLORIDA BABCOCK LUMBER
469042	N	2987	O	11	057	0 0	333218	2	*** CANCELLED ***													FLORIDA BABCOCK LUMBER
469043	N	2987	O	11	057	0 0	333218	2	*** CANCELLED ***													FLORIDA BABCOCK LUMBER
469044	I	2987	O	11	057	0 0	333218	2														FLORIDA BABCOCK LUMBER

DATE 9/27/90 5:16:39 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT PAGE 1

WELL CONSTRUCTION PERMITTING

R0B0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:33 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BNA HBG RS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
445151	I	1051	A	21	081	0 0	023318	3	33	118		0	C	5						0000	NO	TOPGUN H.G.
435606	N	2987	0	21	081	0 0	023318	2	*** CANCELLED ***													ELSBERRY INC.
435607	N	2987	0	11	081	0 0	023318	2	*** CANCELLED ***													ELSBERRY INC.
435608	N	2987	0	21	081	0 0	023318	2	*** CANCELLED ***													ELSBERRY INC.
435609	N	2987	0	21	081	0 0	023318	2	*** CANCELLED ***													ELSBERRY INC.
470119	N	2088	A	21	081	0 0	033318	4	*** CANCELLED ***													EZSBERRY, BRUCE
449330	I	1376	I	21	081	0 0	053318	12	105	610		0	C	3						0000	NO	CANNON, HARRY
449332	I	1376	I	21	081	0 0	053318	12	310	600		0	C	3						0000	NO	CONSOLIDATED MINERAL INC.
700627	C	2073	T	21	081	0 0	053318	4														USGS
447428	I	1360	A	21	081	0 0	063318	4	32	100		0	C	28						0000	NO	LOGGINS, CORBIN
448625	I	1627	A	21	081	0 0	063318	5	92	370	Y	25	R	0						0000	NO	DEPARTMENT OF NATURAL RESOURCES
448875	N	2684	0	21	081	0 0	063318	2	*** CANCELLED ***													MANATEE CO. FACILITIES MGMT.
448876	N	2884	0	21	081	0 0	063318	2	*** CANCELLED ***													MANATEE CO. FACILITIES MGMT.
448879	N	2884	0	21	081	0 0	063318	2	*** CANCELLED ***													MANATEE CO FACLILTIES MGMT.
448880	N	2884	0	21	081	0 0	063318	2	*** CANCELLED ***													MANATEE CO. FACILITIES MGMT.
464170	I	2684	0	21	081	0 0	063318	2	6	20	Y	1	A	4						0000	NO	MANATEE CO.FACILITIES MANAGE.
374340	C	0001	T	21	081	0 0	063318	2	15	22	N	0	C	0					TF1531		NO	TAMPA ELECTRIC CO
300585	C	1627	A	21	081	0 0	073318	3	32	50	N	0	C	2	A	M	C		77-391		NO	BARCO, W. S.
300037	C	1627	A	21	081	0 0	073318	4	47	390	N	0	C	12	A	M	G		76-090		NO	NICHOLS, DR FRED
448361	I	1627	A	21	081	0 0	073318	4	63	260	Y	14	R	0						0000	NO	SWITZER, MOREY(STARLITE CONST.)
469980	I	9033	A	21	081	0 0	073318	4	0	38	Y	5	R	0						0000	NO	ROYSTER, CORP.
448698	N	2858	0	21	081	0 0	073318	2	*** CANCELLED ***													COMMERCIAL CARRIER CORP.
448699	N	2858	0	21	081	0 0	073318	2	*** CANCELLED ***													COMMERCIAL CARRIER CORP.
448700	N	2858	0	21	081	0 0	073318	2	*** CANCELLED ***													COMMERCIAL CARRIER CORP.
448701	N	2858	0	21	081	0 0	073318	2	*** CANCELLED ***													COMMERCIAL CARRIER CORP.
449666	I	2406	0	21	081	0 0	073318	2														FLORIDA POWER CORPORATION
449667	I	2406	0	21	081	0 0	073318	2														FLORIDA POWER CORPORATION
449668	I	2406	0	21	081	0 0	073318	2														FLORIDA POWER CORPORATION
449669	I	2406	0	21	081	0 0	073318	2														FLORIDA POWER CORPORATION
470227	I	9033	0	21	081	0 0	073318	2	45	65	Y	5	R	0						0000	NO	ROYSTER COMPANY
445134	I	1627	A	21	081	0 0	083318	4														DAVIS HOYT
700356	C	1627	D	21	081	0 0	083318	3														COCHRAN, ELBERT LEE
701148	C	1013	D	21	081	0 0	083318	4														AUSTIN, BOB
448357	N	2372	0	21	081	0 0	083318	4	*** CANCELLED ***													AMAX CHEMICAL CORP.
700628	C	2073	T	21	081	0 0	083318	4														USGS
700629	C	2073	T	21	081	0 0	083318	4														USGS
700630	C	2073	T	21	081	0 0	083318	4														USGS
700841	C	2073	T	21	081	0 0	083318	4														USGS
449237	I	1376	A	21	081	0 0	093318	10	340	815		0	C	46						0000	NO	REEDE RANCH

DATE 9/27/90 5:16:39 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT PAGE 2

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:33 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BNA BGRS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
447617	N	1737	D	21	081	0 0	093318	4	*** CANCELLED ***													MAGINESS, JOHN & KATY
448655	I	1376	Y	21	081	0 0	093318	10	0	250		0	C	0						0000	NO	REEDER RANCH
449152	I	1013	A	21	081	0 0	103318	4														BOND, JIM
700762	C	1013	D	21	081	0 0	103318	4														REEDER, GRAHAM
446970	N	1376	A	21	081	0 0	123318	4	*** CANCELLED ***													SHIMANDLE, RICHARD
470250	I	2831	0	21	081	0 0	123318	2														MC CLURE FARMS
470251	I	2831	0	21	081	0 0	143318	2														MC CLURE FARMS
470254	I	2831	0	21	081	0 0	143318	2														MC CLURE FARMS
470255	I	2831	0	21	081	0 0	143318	2														MC CLURE FARMS
448613	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448614	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448615	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448616	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448617	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448618	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
447121	I	1627	A	21	081	0 0	163318	5	202	365	Y	55	R	25						0000	NO	PURSLEY GRASS
471253	I	1627	A	21	081	0 0	163318	8	315	597	Y	75	R	27						0000	NO	DESERET FARMS (SLEIGHT, DON)
449172	I	2870	D	21	081	0 0	163318	4	65	305		0	C	9						0000	NO	IMPERIAL FARMS INC.
700705	C	1627	D	21	081	0 0	163318	4														4 STAR FISH FARMS
301462	E	1627	A	21	081	0 0	173318	4	89	242		0	T	42	A	M	C		000000		NO	SALEM,J
700088	C	1627	A	21	081	0 0	173318	4														SALEM, JOSEPH
447455	I	1627	A	21	081	0 0	173318	5	105	200	Y	28	R	64						0000	NO	BELL, JAMES
301610	C	1627	D	21	081	0 0	173318	4	93	240	N	0	T	35		M	B		78-311		NO	BEASLEY, RANDY
445839	N	1376	D	21	081	0 0	173318	4	*** CANCELLED ***													DUBOIS DON
447501	N	1974	D	21	081	0 0	173318	4	*** CANCELLED ***													CLOSE, BILL
448047	I	1360	D	21	081	0 0	173318	4	47	280		0	C	1						0000	NO	CLEARY, KEN
449329	I	1376	D	21	081	0 0	173318	4	62	160		0	C	0						0000	NO	WILLIAMS, HOWARD
449567	I	1376	D	21	081	0 0	173318	4	83	160		0	C	48						0000	NO	JORDEN, DOUG
700914	C	1627	D	21	081	0 0	173318	4														MOTT, MERLE
701060	C	1627	D	21	081	0 0	173318	4														LEGGETT, DREW
445770	I	1627	A	21	081	0 0	183318	5	57	350	Y	4	R	15						0000	NO	GREINKE DAVID
301557	C	1627	D	21	081	0 0	183318	4	63	302		0	T	11	A				78-236		NO	LEE, MELVIN
445140	I	1627	D	21	081	0 0	183318	4	52	290		0	C	12						0000	NO	FORTWENDEL CLETE
445435	I	1627	D	21	C81	C 0	183316	4	57	300		0	C	0						0000	NO	ROBUCK ROGER
447812	I	1251	D	21	C81	0 0	183318	4	263	300		0	C	14						0000	NO	GADWELL, AMY
501265	I	1366	D	21	081	C 0	183318	4	65	262		0	C	2				A		0000	NO	HEMLER, KENT
501340	I	1376	D	21	081	0 0	183318	4														RICHES
446320	I	1627	D	21	081	0 0	183318	5	60	390	Y	18	R	7						0000	NO	ADAMS LARRY
701217	C	1627	A	21	081	0 0	193318	4														SIPE, MIKE

WELL CONSTRUCTION PERMITTING

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PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	STATIC WATER LEVEL	SP CAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
300040	C	1627	D	21	081	0 0	193318	4	44	110	N	0	C	28	A		F		76-097		NO	FRISBIE, ANNIE
302945	C	1013	D	21	081	0 0	193318	4	40	265		0	R	9					79-194		NO	WARD, JACK
446557	I	1360	D	21	081	0 0	193318	4	30	233		0	C	2						0000	NO	CLOSE BILL
446558	I	1360	D	21	081	0 0	193318	4	30	170		0	C	2						0000	NO	CLOSE BILL
447770	N	1737	D	21	081	0 0	193318	4	*** CANCELLED ***													LOYER, VAL
700922	C	1627	D	21	081	0 0	193318	4														HORNSBY, GARY
701207	C	1013	D	21	081	0 0	193318	4														FRENCH, TIM
701226	C	1627	D	21	081	0 0	193318	4														SMITH, CARL
464430	I	1627	D	21	081	0 0	193318	5	60	200	Y	18	R	10						0000	NO	WYMAN,GREEN & BLALOCK/DOOM,DON
448674	I	2870	H	21	081	0 0	193318	8														WINTERSIT PARK
448837	I	1627	L	21	081	0 0	193318	6	100	100	Y	27	R	0						0000	NO	SIPE, MIKE
448562	I	1974	G	21	081	0 0	193318	3														SWFWMD
448563	I	1974	O	21	081	0 0	193318	3														SWFWMD
472938	I	1627	A	21	081	0 0	203318	5	60	340	Y	18	R	21						0000	NO	HUTTINGER, CAROL
701119	C	1627	D	21	081	0 0	203318	4														VER STRATE, CHRIS
4466[illegible]3	I	1627	D	21	081	0 0	203318	5	40	150	Y	12	R	13						0000	NO	AYRES WILLIAM
470229	I	1627	D	21	081	0 0	203318	5	93	196	Y	16	R	68						0000	NO	STINSON, KIM
447239	N	1979	Y	21	081	0 0	203318	3	*** CANCELLED ***													SWFWMD
301608	C	1627	A	21	081	0 0	213318	4	276	453	N	0	T	11	B	H	B		78-308		NO	GOEBEL, CLYDE
396135	C	2263	A	15	053	0 0	213318	4	84	120	N	0	C	0					000000		NO	DRUMMOND, DAN
447762	N	1376	D	21	081	0 0	213318	5	*** CANCELLED ***													STEVENS, JOHN
700622	C	1360	I	21	081	0 0	213318	4														AMERSON, ROY
463977	N	2368	O	21	081	0 0	223318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463978	N	2368	O	21	081	0 0	223318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
470256	I	2831	O	21	081	0 0	223318	2														BLOSSEM GROVES
470257	I	2831	O	21	081	0 0	223318	2														BLOSSEM GROVES
470258	I	2831	O	21	081	0 0	223318	2														BLOSSEM GROVES
470259	I	2831	O	21	081	0 0	223316	2														BLOSSEM GROVES
470252	I	2831	O	21	081	0 0	243318	2														MC CLURE FARMS
470253	I	2831	O	21	081	0 0	243318	2														MC CLURE FARMS
447492	I	1627	D	21	081	0 0	253318	5	40	100	Y	12	R	16						0000	NO	ALLIGOOD, MIKE
701108	C	1627	A	21	081	0 0	263318	10														PURSLEY TURF FARMS
448179	I	1376	I	21	081	0 0	263318	6	340	700	Y	25	R	45						0000	NO	MANATEE CO. UTILITIES
463973	N	2368	O	21	115	0 0	263318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
470266	I	2831	O	21	081	0 0	263318	2														BLOSSEM GROVES
470267	I	2831	O	21	081	0 0	263318	2														BLOSSEM GROVES
470268	I	2831	O	21	081	0 0	263318	2														BLOSSEM GROVES
470269	I	2831	O	21	081	0 0	263318	2														BLOSSEM GROVES
447752	N	1376	Y	21	081	0 0	263318	6	*** CANCELLED ***													MANATEE CO.UTILITIES

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

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PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	B NA BG RS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
300418	C	1627	D	21	081	0 0	273318	4	90	182	N	0	T	17	A	O	B		77-103		NO	YOUNG, SONNY
300461	C	1627	D	21	081	0 0	273318	4	33	172	N	0	T	35			B		77-175		NO	FINLEY, JOHN
300494	C	1627	D	21	081	0 0	273318	4	80	195	N	0	C	30	A	O	B		77-294		NO	SCHULTZ, NEIL E.
300616	C	1627	D	21	081	0 0	273318	4	126	390	N	0	T	18	A	K	C		77-436		NO	MORAN, CHARLES
445083	I	1627	D	21	081	0 0	273318	4	113	185		0	C	20						0000	NO	ARMSTRONG MARSHALL
446619	I	1627	D	21	081	0 0	273318	5	113	240	Y	28	R	12						0000	NO	ARMSTRONG, MIKE
446906	I	1627	D	21	081	0 0	273318	5	109	295		0	R	15						0000	NO	BARCO, LULA MAE
447736	N	1627	H	21	081	0 0	273318	4	*** CANCELLED ***													STEVENS, JOHN
447364	N	2368	O	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. SOLID WASTE DEPT.
447366	N	2366	O	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. SOLID WASTE DEPT.
447367	N	2366	O	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. SOLID WASTE DEPT.
447368	I	2368	O	21	081	0 0	273318	2														MANATEE CO. SOLID WASTE DEPT.
463971	N	2368	O	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463972	N	2368	O	21	115	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463974	N	2368	O	21	115	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463975	N	2368	O	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463976	N	2368	O	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
470261	I	2831	O	21	081	0 0	273318	2														BLOSSEM GROVES
470263	I	2831	O	21	081	0 0	273318	2														BLOSSEM GROVES
470264	I	2831	O	21	081	0 0	273318	2														BLOSSEM GROVES
470265	I	2831	O	21	081	0 0	273318	2														BLOSSEM GROVES
445136	I	1627	A	21	081	0 0	283318	4	91	290		0	C	6						0000	NO	BOHANAN MARJORIE
470175	I	2874	A	21	081	0 0	283318	4														DEWSACK
700976	C	1365	A	21	081	0 0	283318	4														DUBATS, DON
448859	I	2831	A	21	081	0 0	283318	5	40	330	Y	14	R	5						0000	NO	SPERG, MARK
301638	C	1299	A	21	081	0 0	283318	8	311	960	N	0	C	11	B				78-440		NO	PHARES JR., CLIFTON J.
701199	C	1627	D	21	081	0 0	283318	4														KILLINGSWORTH, JIM
301432	F	1627	A	21	081	0 0	293318	4	73	442		0	T	12	A	P	C		C0C000		NO	BOWEN, B
301438	F	1627	A	21	081	0 0	293318	4	56	380		0	T	9	A	M	C		000000		NO	GARDNER, D
447674	I	2640	A	21	081	0 0	293318	4	94	165		0	C	8						0000	NO	HARPLEY
700058	C	1627	A	21	081	0 0	293318	4														BOWEN, BEN
700063	C	1627	A	21	081	0 0	293318	4														GARDNER, DON
446516	I	1627	A	21	081	0 0	293318	5	81	295	Y	22	R	24						0000	NO	HEATH
448441	I	1627	G	21	081	0 0	293318	5	60	340	Y	18	R	10						0000	NO	SHADOW BROOK MOBILE HOME CONDO.
7010.7	C	1627	H	21	081	0 0	293318	10														BOWEN, BEN F.
448443	I	1627	J	21	081	0 0	293318	5	60	340	Y	18	R	7						0000	NO	SHADOW BROOK MOBILE HOME CONDO.
447365	N	2368	O	21	081	0 0	293318	2	*** CANCELLED ***													MANATEE CO.SOLID WASTE DEPT.
447375	I	1627	A	21	081	0 0	303318	5	42	160	Y	13	R	28						0000	NO	MC HENRY, JOHN
445069	I	1627	D	21	081	0 0	303318	4	43	137		0	C	1						0000	NO	DRAKE GAYLAND

WELL CONSTRUCTION PERMITTING

RGB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:33 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BN BG RS	METHOD	SWL TAE ATV TEE IRL C	SPC CAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
447081	N	1376	D	21	081	0 0	303318	4	*** CANCELLED ***													ADAMS, DURAND J.
701204	C	1627	D	21	081	0 0	303318	4														HOWELL, ERNEST
449171	I	2831	D	21	081	0 0	303318	5														ROBERTSON, KENNETH
700805	C	1627	E	21	081	0 0	303318	4														GENERAL ASPHALT CO OF BRADENTON
445302	N	1979	0	21	081	0 0	303318	6	*** CANCELLED ***													SWFWMD
445301	I	1979	0	21	081	0 0	303318	8	236	321		0	R	0						0000	NO	SWFWMD
445304	I	1979	0	21	081	0 0	303318	8	1047	1260	Y	65	R	0						0000	NO	SWFWMD
448222	N	1276	0	21	081	0 0	303318	8	*** CANCELLED ***													SWFWMD
447756	N	2502	Y	21	081	0 0	303318	4	*** CANCELLED ***													TIPE LAKE R.V.
700886	C	1051	A	21	081	0 0	313318	4														LAURENT, H. S.
700899	C	1051	A	21	081	0 0	313316	4														LEGRANGE, W. A.
447118	N	1051	D	21	081	0 0	313318	4	*** CANCELLED ***													LAWRENCE - DUCKWORTH
700851	C	1051	D	21	081	0 0	313318	4														YANKEE, ROBERT
447965	I	1376	D	21	081	0 0	313318	5	120	200	Y	18	R	23						0000	NO	FIRST CHURCH OF GOD
470294	I	2987	0	21	081	0 0	313318	2	2	15	Y	2	A	0						0000	NO	ROYAL CROWN BOTTLING CO.
470295	I	2987	0	21	081	0 0	313318	2	2	15	Y	2	A	0						0000	NO	ROYAL CROWN BOTTLING CO.
470296	I	2987	0	21	081	0 0	313318	2	2	15	Y	2	A	0						0000	NO	ROYAL CROWN BOTTLING CO.
470297	I	2987	0	21	081	0 0	313316	2	2	15	Y	2	A	0						0000	NO	ROYAL CROWN BOTTLING CO.
701053	C	1627	Z	21	081	0 0	313318	3														CHAUNCEY, JERRY
700674	C	1627	A	21	081	0 0	323318	4														BOWEN FAMILY TRUST
449462	I	1627	A	21	081	0 0	323318	5	102	470	Y	27	R	17						0000	NO	DAKIN, SHERBURN
700696	C	1627	A	21	081	0 0	323318	6														CREATIVE GROWERS, INC.
300006	C	1627	D	21	081	0 0	323318	4	62	190	N	0	C	19			B		76-005		NO	HUGHES, C. E. & EDWARDS, LEE
300008	C	1627	D	21	081	0 0	323318	4	31	190	N	0	C	19	A	O	F		76-009		NO	HUGHES, CURTIS W.
449388	I	2870	A	21	081	0 0	343318	4	90	205		0	C	18						0000	NO	ARNESON
447189	I	1627	A	21	081	0 0	343318	5	199	440	Y	55	R	0						0000	NO	ARMSTRONG, MIKE
445708	I	1627	A	21	081	0 0	353318	4	41	344	Y	5	R	15						0000	NO	MASTERS MERCHANDISE MART
446766	N	1051	A	21	081	0 0	353318	4	*** CANCELLED ***													POWELL, JACK
701093	C	1627	A	21	081	0 0	353318	4														CHADSEY, TAYLOR
701162	C	1627	A	21	081	0 0	353318	4														CHADSEY JR., TAYLOR B.
464078	I	2587	0	21	081	0 0	363318	2														UNION 76
464080	I	2587	0	21	081	0 0	363318	2														UNION 76
464082	I	2587	0	21	081	0 0	363318	2														UNION 76
464084	I	2587	0	21	081	0 0	363318	2														UNION 76

DATE 9/27/90 5:31:35 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT PAGE 1

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RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 1 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOP	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
445952	N	1627	A	21	081	0 0	013317	3	*** CANCELLED ***													SIPE MIKE
449243	I	2831	A	21	081	0 0	013317	5	60	300	Y	19	R	0						0000	NO	SIPE, MIKE
447592	N	1376	D	21	081	0 0	013317	5	*** CANCELLED ***													MANATEE CO. PORT AUTHORITY
300069	C	1627	L	21	081	0 0	013317	4	57	290	N	0	T	4			B		76-165		NO	SIPE, MIKE
447659	I	1627	L	21	081	0 0	013317	5	103	800	Y	18	R	9						0000	NO	LAVENDER, JACK
448405	I	1048	M	21	081	0 0	013317	16	100	100	Y	0	R	0						0000	NO	SIPE, MICHAEL
446462	N	2372	O	21	081	0 0	013317	2	*** CANCELLED ***													MANATEE PORT AUTHORITY
446463	N	2372	O	21	081	0 0	013317	2	*** CANCELLFD ***													MANATEE PORT AUTHORITY
446464	N	2372	O	21	081	0 0	013317	2	*** CANCELLED ***													MANATEE PORT AUTHORITY
446495	N	2372	O	21	081	0 0	013317	2	*** CANCELLED ***													MANATEE PORT AUTHORITY
446496	N	2372	O	21	081	0 0	013317	2	*** CANCELLED ***													MANATEE PORT AUTHORITY
446497	N	2372	O	21	081	0 0	013317	2	*** CANCELLED ***													PORT MANATEE AUTHORITY
447949	N	2338	O	21	081	0 0	013317	2	*** CANCELLED ***													FLA.DEPT.OF ENVIRONMENT REGUL.
447980	N	2338	O	21	081	0 0	013317	2	*** CANCELLED ***													FLA. DEPT.OF ENVIRONMENTAL REG.
447981	N	2338	O	21	081	0 0	013317	2	*** CANCELLED ***													FLA. DEPT. OF ENVIRONMENTAL REG
447982	N	2338	O	21	081	0 0	013317	2	*** CANCELLFD ***													FLA. DEPT. OF ENVIRONMENTAL REG
447983	N	2338	O	21	081	0 0	013317	2	*** CANCELLED ***													FLA. DEPT. OF ENVIRONMENTAL REG
449247	I	1974	O	21	081	0 0	013317	2	8	8	Y	1	A	0						0000	NO	TECO
464003	I	2858	O	21	081	0 0	013317	2	13	13	Y	1	A	0						0000	NO	COUNTY OF MANATEE
464005	I	2858	O	21	081	0 0	013317	2	13	13	Y	1	A	0						0000	NO	COUNTY OF MANATEE
464007	I	2858	O	21	081	0 0	013317	2	13	13	Y	1	A	0						0000	NO	COUNTY OF MANATEE
464008	I	2858	O	21	081	0 0	013317	2	13	13	Y	1	A	0						0000	NO	COUNTY OF MANATEE
447560	I	2372	O	21	081	0 0	013317	8	22	22		0	C	5						0000	NO	PORT MANATEE
447561	I	2372	O	21	081	0 0	013317	8	22	22	Y	2	R	8						0000	NO	PORT MANATEE
447984	N	2338	T	21	081	0 0	013317	1	*** CANCELLFD ***													FLA. DEPT. OF ENVIRONMENTAL REG
374408	C	0001	T	21	081	0 0	013317	2	4	8	N	0	R	0					SM-05		NO	TAMPA ELECTRIC CO

DATE 9/27/90 5:44:37 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT PAGE 1

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:12 - 13 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
394010	C	2382	A	15	053	0 0 123317	4	63	65	N	0	C	7					LOT 37		NO	DANDREA, MIRIAM
447372	I	1627	A	21	081	0 0 123317	5	47	220	Y	14	R	20						0000	NO	ZIROUX, ERNEST
447793	I	1627	A	21	081	0 0 133317	5														BROSIUS, RUSSELL

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:23 - 27 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BRG NARS	METHOD	STATIC WATER LEVEL	SP CAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
300522	C	1627	D	21	081	0 0	243317	3	62	180	N	0	C	0		Q	C	B	77-293		NO	HARLLEE, ELLA
7C0580	C	1627	D	21	081	0 0	243317	4														FAITH OF DELIVERENCE CHURCH
464289	I	1376	D	21	081	0 0	243317	5	42	160		0	C	3						0000	NO	GAY, RONALD L.
387964	C	2263	A	15	053	0 0	253317	4	63	110	N	0	C	35					000000		NO	MR. WHITACRE
445028	I	1627	A	21	081	0 0	253317	4	30	175		0	C	20						0000	NO	GLASS HARRY / WALLACE JAMES
446618	I	1013	A	21	081	0 0	253317	4	30	100		0	C	8						0000	NO	MARTIN JACK
448108	I	1051	A	21	081	0 0	253317	4	40	115		0	C	8						0000	NO	WOODSON, BILL
300133	C	1627	D	21	081	0 0	253317	4	68	230	N	0	T	6	A	Q	C		76-323		NO	UNDERWOOD, W. R.
445700	N	1376	D	21	081	0 0	253317	4	*** CANCELLED ***													BENJAMIN GEORGE
301507	C	1627	D	21	081	0 0	263317	3	37	100		0	C	10	A				000000		NO	TERRA C BAP
302843	C	1627	D	21	081	0 0	263317	3	65	125	N	0	C	7	A	M	C	B	M79-14		NO	DUNBAR, ROOSEVELT
7C0133	C	1627	D	21	081	0 0	263317	3														TERRA CEIA BAPTIST CHURCH
302907	C	1627	D	21	081	0 0	263317	4	37	122	N	0	T	2		R	C	B	79-129		NO	MANATEE DAY CARE CENTER
700375	C	1627	D	21	081	0 0	273317	3														CAMPBELL, DONALD
445766	I	1627	D	21	081	0 0	273317	4	262	328	Y	49	R	0						0000	NO	MULBERRY DAVE
448866	I	2831	D	21	081	0 0	273317	5	60	240	Y	18	R	0						0000	NO	HODGER, DEBBIE
448887	I	1627	D	21	081	0 0	273317	5	82	300	Y	21	R	1						0000	NO	MC CLANATHAN, MICHAEL
471217	I	1627	D	21	081	0 0	273317	5	160	300	Y	49	R	5						0000	NO	GRANT III, JAMES T.
447228	I	2251	Y	21	081	0 0	273317	6	50	100		0	C	0						0000	NO	MIXON, WILLIAM D.

DATE 9/27/90 6:10:55 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT PAGE 1

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:34 - 35 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	RB NA BG RS	METHOD	SWL TAE ATV TEE IPL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
445011	I	1627	A	21	081	0 0	343317	4	40	100		0	C	10						0000	NO	BRENTSON EVAN R.
700828	C	1013	A	21	081	0 0	343317	4														KEZAR, FATHER
701038	C	1013	A	21	081	0 0	343317	4														COYNER, DON
446014	I	1627	A	21	081	0 0	343317	5	62	144		0	R	6						0000	NO	KOOLS KEVIN
446530	I	1627	A	21	081	0 0	343317	5	93	140	Y	25	R	1						0000	NO	TINSLEY T.L.
446554	I	1627	A	21	081	0 0	343317	5	47	340	Y	13	R	J						0000	NO	JARVIS CONSTRUCTION WELL#2
446555	I	1627	A	21	081	C 0	343317	5	40	440	Y	12	R	0						0000	NO	JARVIS CONSTRUCTION WELL#1
463889	I	1627	A	21	115	0 0	343317	5														WHITEHEAD, BRENT
470311	I	1627	A	21	081	0 0	343317	5														WHITEHEAD, BRENT
301458	E	1627	D	21	081	0 0	343317	3	35	145		0	C	0		S	C		C00000		NO	WEVER,B
447054	N	1051	D	21	081	0 0	343317	3	*** CANCELLED ***													JOHNSON, BOOTS
700083	C	1627	D	21	081	0 0	343317	3														WEVER, BYRON
300550	C	1627	D	21	081	0 0	343317	4	48	72	N	0	C	10			C	B	77-337		NO	YEAGER, MIKE
301407	E	1627	D	21	081	0 0	343317	4	60	122		0	T	1	A	Q	C		000000		NO	KITCHELL,L
301500	E	1627	D	21	081	0 0	343317	4	40	115		0	C	0					000000		NO	HINSON,H N
445474	I	1627	D	21	081	0 0	343317	4	48	260		0	C	0						0000	NO	PERVIS JIM
445684	I	1627	D	21	081	0 0	343317	4	52	100	Y	5	R	0						0000	NO	COUCH DEL
445797	I	1627	D	21	081	0 0	343317	4	53	101		0	R	0						0000	NO	WILSON PAUL
463996	I	1376	D	21	081	0 0	343317	4	30	80	Y	14	R	6						0000	NO	MADDOX, MIKE
700033	C	1627	D	21	081	0 0	343317	4														KITCHELL, LARRY
700126	C	1627	D	21	081	0 0	343317	4														HINSON, H. N.
700502	C	1627	D	21	081	0 0	343317	4														MARLOW, MARK
700809	C	1627	D	21	081	0 0	343317	4														LINDSEY, PEGGY
447394	I	1627	D	21	081	0 0	343317	5	45	100	Y	13	R	0						0000	NO	ENGLERT, GEORGE
300036	C	1627	A	21	081	0 0	353317	3	65	150	N	0	C	0	A	R	B		76-089		NO	DAVIS, JESSE
300518	C	1627	A	21	081	0 0	353317	3	66	117	N	0	C	2	A	Q	C	B	77-285		NO	DETAR, JEAN B.
300534	C	1627	A	21	081	0 0	353317	3	41	142	N	0	C	1			C	B	77-308		NO	STEINER, OTTO
300578	C	1627	A	21	081	0 0	353317	3	56	113	N	0	C	2	A	Q	C		77-379		NO	ERLANDSON, CARL
300584	C	1627	A	21	081	0 0	353317	3	43	70	N	0	C	1	A	R	C		77-390		NO	LEE, CAPTAIN C. J.
300601	C	1627	A	21	081	0 0	353317	3	54	116	N	0	C	3	A	Q	C	B	77-419		NO	SHOVER, JOHN
301463	E	1627	A	21	081	0 0	353317	3	90	120		0	C	2	A	P	C		000000		NO	TEJKL,H
301474	C	1627	A	21	081	0 0	353317	3	31	140		0	C	2	A	R	C		000000		NO	CAMPBELL,A
301515	E	1627	A	21	081	0 0	353317	3	50	100		0	C	6	A	Q	C		000000		NO	MERHOFF,D
301521	E	1013	A	21	081	0 0	353317	3	52	107		0	C	6	A				000000		NO	D'AMELIO,G
301533	C	1627	A	21	081	0 0	353317	3	52	108		0	C	6	R	Q	C		78-208		NO	MCALLISTER, LLOYD
301664	C	1627	A	21	081	0 0	353317	3	54	150	N	0	C	2	C	Q	B		78-484		NO	DALGAARD, CARLTON
301668	C	1627	A	21	081	0 0	353317	3	66	135	N	0	C	2					78-490		NO	SANSKY, ANN
302888	C	1627	A	21	081	0 0	353317	3	69	120	N	0	T	1		Q	C	B	M79-84		NO	UNSEL, ARVEL
302894	C	1627	A	21	081	0 0	353317	3	70	130	N	0	T	2		Q	C	B	M79-97		NO	FERGUSON, MARVIN H.

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:34 - 35 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBER	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NR BAGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
700089	C	1627	A	21	081	0 0	353317	3														TEJKL, HAROLD
700100	C	1627	A	21	081	0 0	353317	3														CAMPBELL, A. P.
700141	C	1627	A	21	081	0 0	353317	3														MERHOFF, DON
700147	C	1627	A	21	081	0 0	353317	3														D'AMELIO, GUY
700421	C	1627	A	21	081	0 0	353317	3														KING, FLORENCE
700496	C	1627	A	21	081	0 0	353317	3														MAY, STANLEY F.
700465	C	1627	A	21	081	0 0	353317	3														LOCKARD, THURMAN
700920	C	1627	A	21	081	0 0	353317	3														SPICER, WILLIS
701033	C	1627	A	21	081	0 0	353317	3														ELZERMAN, DICK
464313	I	1360	A	21	081	0 0	353317	4														KRANER, MR.
700850	C	1013	A	21	061	0 0	353317	4														HANNAH, ED
700985	C	1627	A	21	081	0 0	353317	4														SEIZ, FRANK
701003	C	1627	A	21	081	0 0	353317	4														ELZERMAN, DICK
446726	I	1627	A	21	081	0 0	353317	5	54	100	Y	15	R	0						0000	NO	MARQUINE C.
449031	I	1627	A	21	081	0 0	353317	5	82	170	Y	22	R	2						0000	NO	RIESEL, ERNEST
470284	I	1627	A	21	081	0 0	353317	5														HARMON, ROBERT
300598	C	1627	D	21	081	0 0	353317	3	46	70	N	0	C	0		P	C		77-411		NO	WHITNEY, HARRY
300602	C	1627	D	21	081	0 0	353317	3	50	116	N	0	C	0		Q	C		77-420		NO	SHOVER, JOHN
448331	I	1627	D	21	081	0 0	353317	5	58	200	Y	15	R	9						0000	NO	CAMPBELL, WILLARD
449327	I	1627	D	21	081	0 0	353317	5	62	220	Y	19	R	18						0000	NO	FERENCZ, JIM

B&V WASTE SCIENCE AND TECHNOLOGY CORP.   Reference 20

TELEPHONE MEMORANDUM

Site Assessment
AMAX Phosphate Facility

BVWST Project 52012.065
BVWST File E.1
July 14, 1992
2:45 p.m.

Water Distribution System

To:	Supervisor
Company:	Mnatee County Water Department
Phone No.:	(813) 792-8811
Recorded by:	Eric Holder EH 9/16/92

All of Manatee County is served by Manatee County Water Department except the City of Bradington.

Manatee County gets its water solely from intakes on Lake Manatee.

Manatee County Water Department serves 51,660 people.

There are 5,196 people in the county not served by the water department. It is assumed that they get their water from private wells.

B&V WASTE SCIENCE AND TECHNOLOGY CORP. Reference 21

TELEPHONE MEMORANDUM

Site Assessment
AMAX Phosphate Facility

BVWST Project 52012.065
BVWST File E.1
July 14, 1992
3:15 p.m.

Water Distribution System

To: Allen Kouvarez
Company: Hillsborough County Water Department
Phone No.: (813) 272-5977

Recorded by: Eric Holder EH 9/16/92

The whole area north of Southern Hillsboro County line to four-mile radius is served by private wells in Hillsborough County.

The Water Department does not service any area along the coast south of Gulf City.

Table 6. Household, Family, and Group Quarters Characteristics: 1990

[For definitions of terms and meanings of symbols, see text]

State County Place and [In Selected States] County Subdivision	Persons in households	All households	Family households: Total	Family households: Married-couple family	Family households: Female householder, no husband present	Nonfamily households: Total	Householder living alone: Total	Householder living alone, 65 years and over: Total	Householder living alone, 65 years and over: Female	Persons per—: Household	Persons per—: Family	Persons in group quarters: Total	Persons in group quarters: Institutionalized persons	Persons in group quarters: Other persons in group quarters
The State	12 630 464	5 134 869	3 511 825	2 781 734	544 346	1 623 044	1 309 904	581 463	436 803	2.46	2.96	307 461	173 637	133 824
COUNTY														
Alachua County	170 802	71 258	41 151	30 381	8 562	30 107	18 905	4 614	3 623	2.40	3.00	10 794	2 793	8 001
Baker County	16 647	5 554	4 511	3 630	699	1 043	871	380	277	3.00	3.36	1 839	1 787	52
Bay County	124 113	48 938	35 808	28 753	5 432	13 330	11 272	3 956	3 009	2.54	2.98	2 881	1 526	1 355
Bradford County	19 303	7 193	5 470	4 340	884	1 723	1 484	688	515	2.68	3.10	3 212	3 178	34
Brevard County	392 371	161 365	113 149	93 552	14 671	48 216	38 224	15 090	11 364	2.43	2.88	6 647	3 618	3 029
Broward County	1 239 535	528 442	335 022	263 634	52 923	193 420	155 981	75 919	58 732	2.35	2.91	15 953	11 419	4 534
Calhoun County	9 936	3 793	2 784	2 148	508	1 009	920	474	364	2.64	3.13	1 013	1 013	-
Charlotte County	108 214	48 433	35 325	31 382	2 914	13 108	11 143	7 383	5 402	2.23	2.59	2 761	2 542	219
Citrus County	92 134	40 573	29 679	25 600	2 752	10 894	9 387	5 714	4 128	2.27	2.64	1 381	1 205	176
Clay County	104 773	38 063	29 643	25 251	3 323	7 920	6 556	1 725	1 325	2.88	3.16	1 213	1 138	75
Collier County	148 534	61 703	43 796	37 482	4 386	17 908	13 929	6 617	5 130	2.41	2.80	3 866	1 164	2 401
Columbia County	41 804	15 611	11 516	8 829	2 033	4 095	3 548	1 412	1 035	2.67	3.13	1 009	618	391
Dade County	1 904 375	692 355	481 363	342 511	103 371	211 032	172 164	69 425	52 069	2.75	3.25	32 778	20 111	12 668
DeSoto County	21 517	8 222	6 046	4 830	893	2 176	1 830	1 016	745	2.62	3.02	2 348	1 802	546
Dixie County	10 021	3 916	2 904	2 380	390	1 022	879	390	266	2.56	2.98	564	550	14
Duval County	654 003	257 245	175 353	131 780	35 269	81 892	66 906	21 667	17 346	2.54	3.10	18 988	6 486	12 302
Escambia County	253 191	98 608	70 068	53 113	13 882	28 540	23 330	8 633	6 855	2.57	3.05	8 837	2 731	6 076
Flagler County	28 522	11 380	9 168	8 065	843	2 712	2 253	1 198	836	2.40	2.72	179	102	77
Franklin County	8 748	3 608	2 566	2 117	344	1 042	923	476	343	2.42	2.88	199	167	32
Gadsden County	38 834	13 405	10 139	6 522	3 016	3 266	2 886	1 321	1 021	2.80	3.30	2 287	2 103	184
Gilchrist County	8 712	3 204	2 480	2 125	306	724	624	322	219	2.64	3.02	965	922	32
Glades County	7 451	2 865	2 119	1 837	222	746	638	336	209	2.57	2.96	190	49	141
Gulf County	11 068	4 324	3 342	2 622	576	1 082	977	484	304	2.56	3.00	435	425	10
Hamilton County	9 705	3 486	2 634	1 870	643	852	778	351	257	2.81	3.30	1 135	1 089	46
Hardee County	18 674	6 281	5 070	4 116	687	1 315	1 126	649	480	2.96	3.31	665	195	470
Hendry County	25 153	8 403	6 533	5 098	1 017	1 880	1 470	677	422	2.99	3.36	620	377	243
Hernando County	100 547	42 300	33 567	29 750	2 923	8 733	7 315	5 185	3 804	2.37	2.60	984	855	109
Highlands County	67 369	29 541	21 398	18 721	2 073	8 148	7 147	4 667	3 524	2.28	2.67	1 063	699	364
Hillsborough County	815 620	324 672	219 165	165 443	39 805	105 287	82 246	28 426	20 294	2.51	3.04	18 424	7 961	10 463
Holmes County	14 834	5 800	4 317	3 520	648	1 483	1 370	730	571	2.56	3.02	944	873	71
Indian River County	88 774	38 037	27 162	23 325	2 676	10 875	9 001	5 083	3 854	2.33	2.73	1 434	1 036	398
Jackson County	38 974	14 466	10 904	8 177	1 993	3 561	3 066	1 634	1 320	2.58	3.07	4 401	3 282	1 119
Jefferson County	11 091	3 982	2 980	2 154	684	1 002	882	438	330	2.79	3.29	205	198	7
Lafayette County	4 721	1 721	1 344	1 101	183	377	330	183	129	2.74	3.14	857	755	102
Lake County	148 300	63 414	46 256	39 593	5 111	17 358	15 113	9 315	7 176	2.35	2.75	2 801	1 702	1 099
Lee County	329 786	140 124	98 698	84 383	11 423	40 426	32 280	17 058	12 670	2.35	2.74	5 329	3 154	2 175
Leon County	181 867	74 828	46 118	33 804	9 228	28 710	20 190	4 543	3 627	2.43	3.02	10 938	2 806	8 131
Levy County	25 402	10 079	7 421	5 979	1 115	2 658	2 259	1 143	825	2.52	2.94	521	443	78
Liberty County	4 392	1 708	1 288	1 037	183	420	374	188	137	2.60	3.15	677	677	-
Madison County	15 213	5 522	4 103	2 904	947	1 419	1 282	682	523	2.75	3.25	1 356	1 281	75
Manatee County	208 475	91 080	61 658	51 711	7 619	29 421	24 980	14 647	11 515	2.29	2.74	3 232	2 465	767
Marion County	190 808	78 177	57 039	48 300	6 025	21 138	17 924	9 182	6 703	2.44	2.86	3 937	3 513	424
Martin County	98 256	43 022	30 080	26 030	2 616	12 942	10 756	6 110	4 676	2.28	2.60	2 644	2 437	207
Monroe County	75 167	33 583	20 398	17 427	2 158	12 185	9 331	2 765	1 788	2.24	2.73	2 927	576	2 351
Nassau County	43 472	16 192	12 158	10 086	1 532	4 034	3 439	1 320	906	2.68	3.13	469	344	125
Okaloosa County	138 561	53 313	39 703	33 342	5 059	13 610	11 161	3 258	2 317	2.60	3.03	5 225	2 477	2 748
Okeechobee County	28 084	10 214	7 686	6 281	984	2 519	1 853	871	610	2.75	3.11	1 543	514	1 029
Orange County	653 343	254 832	171 138	132 061	29 574	83 734	60 340	17 792	14 164	2.56	3.07	24 148	8 068	16 080
Osceola County	106 070	39 150	29 107	23 817	3 736	10 043	7 828	3 279	2 526	2.68	3.07	2 658	1 087	1 571
Palm Beach County	847 780	365 558	242 173	199 306	31 514	123 385	100 416	52 682	41 539	2.32	2.81	15 738	9 605	6 133
Pasco County	274 679	121 674	85 672	73 814	8 865	36 002	31 221	20 676	15 389	2.26	2.65	6 132	3 368	2 764
Pinellas County	830 111	380 636	236 554	191 029	35 742	144 081	121 311	64 388	51 138	2.18	2.73	21 548	16 086	5 462
Polk County	396 256	156 940	114 554	92 670	16 840	41 415	34 952	17 304	13 381	2.53	2.98	10 128	6 826	3 302
Putnam County	63 814	25 070	18 372	14 503	2 986	6 698	5 602	2 814	2 114	2.55	3.00	1 152	843	307
St. Johns County	81 464	33 428	23 280	19 185	3 110	10 168	8 046	3 338	2 529	2.44	2.90	2 386	1 336	1 050
St. Lucie County	147 781	59 174	43 317	36 610	5 734	14 857	11 782	6 004	4 606	2.54	2.97	2 410	1 569	841
Santa Rosa County	80 256	29 903	23 336	19 491	2 936	6 564	5 463	1 816	1 304	2.68	3.08	1 349	598	751
Sarasota County	273 014	125 403	83 732	71 914	9 223	41 781	34 718	20 768	16 401	2.18	2.61	4 780	3 604	1 156
Seminole County	284 673	107 657	77 366	63 074	10 806	30 292	22 676	6 624	5 447	2.64	3.11	2 868	2 187	680
Sumter County	29 830	12 119	8 803	7 235	1 318	3 226	3 001	1 575	1 063	2.46	2.88	1 747	1 520	227
Suwannee County	26 225	10 034	7 429	5 948	1 135	2 605	2 328	1 258	887	2.61	3.07	545	458	87
Taylor County	17 058	6 401	4 638	3 627	778	1 563	1 388	642	476	2.67	3.10	52	47	5
Union County	7 749	2 858	2 105	1 683	330	752	698	338	264	2.71	3.31	2 504	2 476	28
Volusia County	367 380	153 416	102 990	84 016	14 922	50 536	40 482	21 085	16 388	2.33	2.80	13 332	6 064	7 278
Wakulla County	14 042	5 210	4 040	3 192	640	1 170	990	380	283	2.70	3.07	160	157	3
Walton County	27 534	11 294	8 142	6 899	1 145	3 152	2 770	1 232	913	2.44	2.80	226	212	14
Washington County	16 438	6 443	4 828	3 916	717	1 615	1 482	828	608	2.55	3.00	461	449	12
PLACE AND COUNTY SUBDIVISION														
Aberdeen CDP, Palm Beach County	2 372	1 072	913	869	38	159	133	49	34	2.40	2.59	-	-	-
Alachua city, Alachua County	4 528	1 637	1 255	823	384	382	329	113	88	2.75	3.16	21	-	21
Alford town, Jackson County	484	142	139	108	25	43	40	25	20	2.55	2.94	6	-	6
Altamonte Springs city, Seminole County	34 618	15 422	8 654	6 614	1 547	6 778	5 052	676	703	2.24	2.81	264	249	15
Altha town, Calhoun County	487	193	128	90	38	65	60	38	32	2.58	3.25	-	-	-
Alva CDP, Lee County	1 036	430	316	271	29	114	87	74	57	2.41	2.80	-	-	-
Andover CDP, Dade County	8 251	2 736	1 602	1 130	364	1 134	873	486	383	2.28	2.59	-	-	-
Anna Maria city, Manatee County	1 744	820	540	487	53	280	228	123	94	2.13	2.58	-	-	-
Apalachicola city, Franklin County	2 582	1 034	690	486	188	344	301	167	130	2.47	3.05	50	48	2
Apollo Beach CDP, Hillsborough County	5 880	2 402	1 858	1 676	168	544	434	213	166	2.44	2.75	36	-	36
Apopka city, Orange County	13 446	5 112	3 822	3 001	614	1 290	958	314	234	2.63	2.99	66	48	18
Arcadia city, De Soto County	6 112	2 389	1 594	1 084	402	785	674	404	322	2.56	3.16	376	154	222
Archer city, Alachua County	1 372	501	344	227	102	157	138	69	58	2.74	3.37	-	-	-
Asbury Lake CDP, Clay County	2 072	710	645	586	36	65	53	19	12	2.92	3.08	-	-	-
Astatula town, Lake County	977	361	296	260	23	65	57	32	24	2.71	3.01	4	4	-
Astor CDP, Lake County	1 273	596	416	380	46	179	153	62	51	2.14	2.60	-	-	-
Atlantic Beach city, Duval County	11 636	4 541	3 139	2 446	581	1 402	1 094	254	206	2.56	3.03	-	-	-
Atlantis city, Palm Beach County	1 653	775	586	549	27	189	176	137	119	2.13	2.46	-	-	-
Auburndale city, Polk County	8 733	3 385	2 501	1 864	437	884	737	391	314	2.58	3.00	125	115	10
Aventura CDP, Dade County	14 909	8 099	4 447	3 905	412	4 462	4 058	2 626	2 088	1.86	2.25	5	-	5

TP84 [POSTSCRIPT] CPH112 CENSUS90 [illegible] 09/23/91 3:04 PM MACHINE: C DATA:CENSUS90 PH1TPSDAT12 09/23/91 14:52:57 OUTPUT:CNTS-PAGE PAGE: 79
TIF:CENSUS90 [illegible] 09/23/91 14:53:13 UTF:CENSUS90 [illegible] 09/23/91 14:53:13 META:CENSUS90 PH1TABLE512 09/23/91 15:01:18

NOTE: The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 15, 1991.

Reference 23

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

**MANATEE COUNTY,
FLORIDA**
(UNINCORPORATED AREAS)

PANEL 19 OF 550
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120153 0019 B

MAP REVISED:
MARCH 15, 1984

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

**MANATEE COUNTY,
FLORIDA**
(UNINCORPORATED AREAS)

PANEL 18 OF 550
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120153 0018 B

MAP REVISED:
MARCH 15, 1984

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

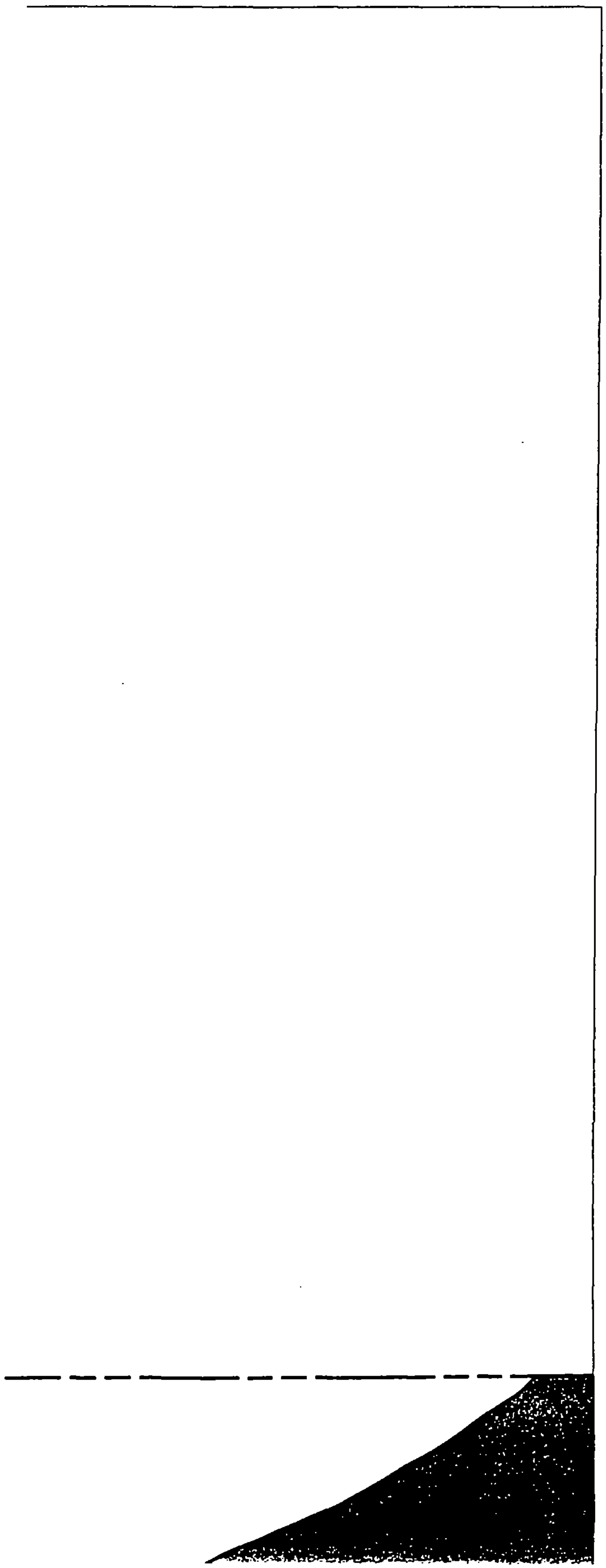
MANATEE COUNTY, FLORIDA
(UNINCORPORATED AREAS)

PANEL 182 OF 550
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120153 0182 B

MAP REVISED:
MARCH 15, 1984

Federal Emergency Management Agency



KEY TO MAP

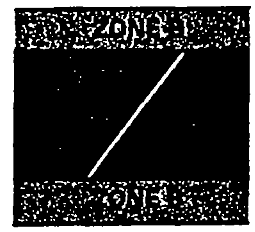
500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations* With Date of Identification e.g., 12/2/74

100-Year Flood Boundary

500-Year Flood Boundary



Base Flood Elevation Line With Elevation In Feet**	~~~513~~~
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	— — —
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

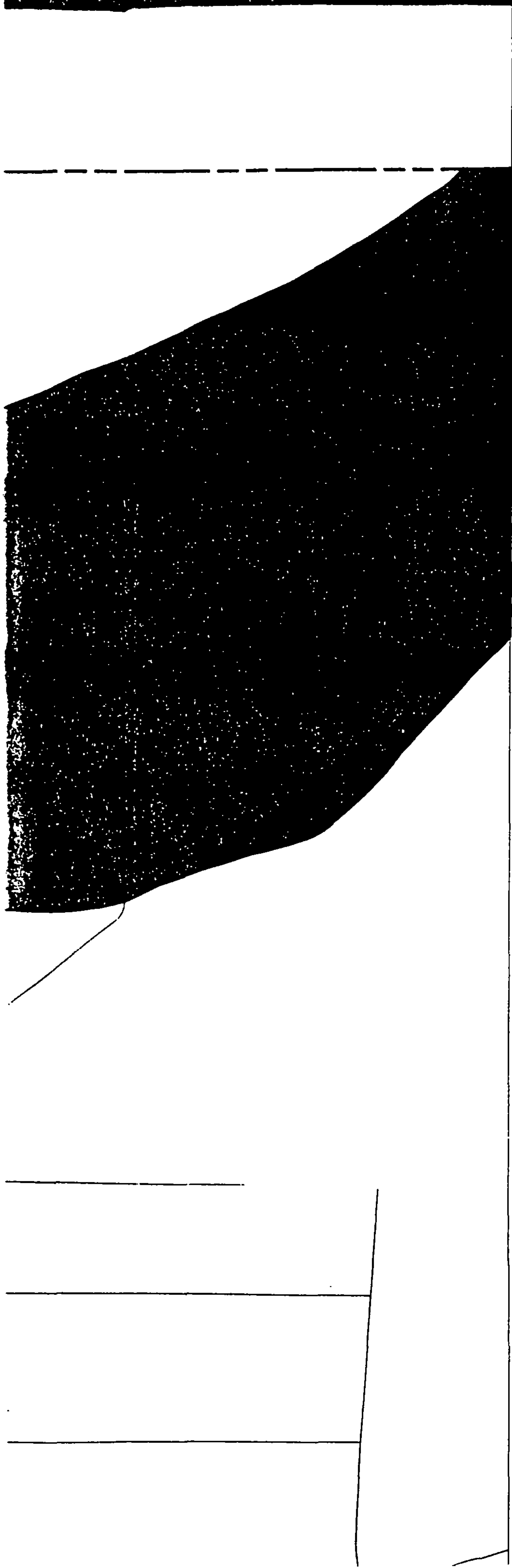
For adjoining map panels, see separately printed Index To Map Panels.

Coastal base flood elevations apply only landward of the shoreline shown on this map.

Coastal base flood elevations shown on this map include the effects of wave action.

INITIAL IDENTIFICATION:
JUNE 26, 1971

FLOOD HAZARD BOUNDARY MAP REVISIONS:



may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

Coastal base flood elevations apply only landward of the shoreline shown on this map.

Coastal base flood elevations shown on this map include the effects of wave action.

INITIAL IDENTIFICATION:
JUNE 26, 1971

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:
JUNE 26, 1971

FLOOD INSURANCE RATE MAP REVISIONS:
Interim map revision July 1, 1974 to change zone designations.

Map revised February 20, 1976 to reflect curvilinear boundary and to show changes in base flood elevations.

Map revised March 15, 1984 to change zone designations and base flood elevations reflecting wave action effects, and to change special flood hazard areas, base flood elevations, zone designations and corporate limits.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

N

APPROXIMATE SCALE

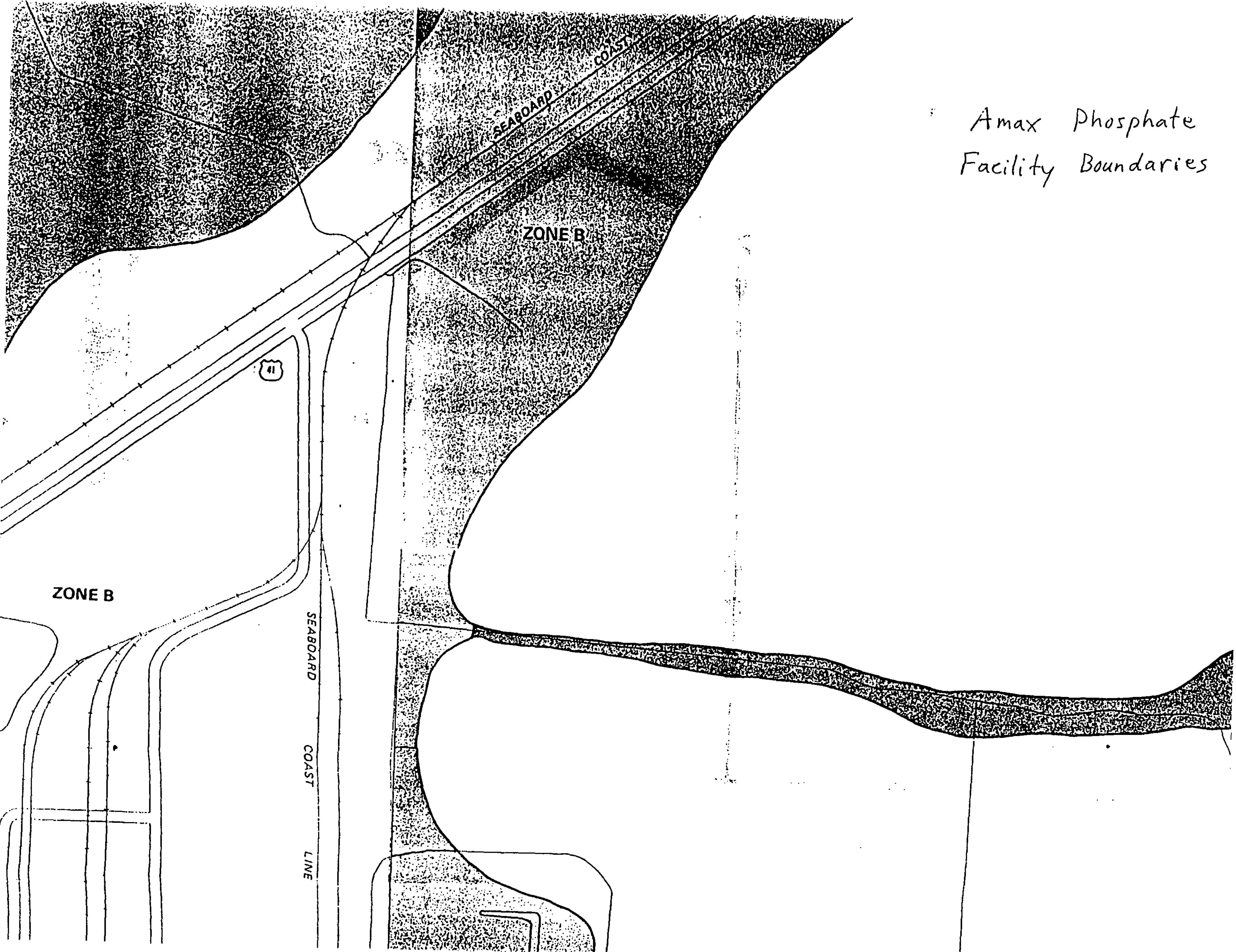
500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

Amax Phosphate
Facility Boundaries



Reference 24

"Rite in the Rain"
WEATHERPROOF

LEVEL

NOTEBOOK NO. 311

FJ-2583

AMAX Phosphate

TDD: F4-9009-01

Palmetto, Manatee County,
Florida

P.M.: Maureen Gordon

LOGBOOK REQUIREMENTS
REVISED - NOVEMBER 29, 1988

NOTE: ALL LANGUAGE SHOULD BE FACTUAL AND OBJECTIVE

1. Record on front cover of the Logbook: TDD No., Site Name, Site Location, Project Manager.
2. All entries are made using ink. Draw a single line through errors. Initial and date corrections.
3. Statement of Work Plan, Study Plan, and Safety Plan discussion and distribution to field team with team members' signatures.
4. Record weather conditions and general site information.
5. Sign and date each page. Project Manager is to review and sign off on each logbook daily.
6. Document all calibration and pre-operational checks of equipment. Provide serial numbers of equipment used onsite.
7. Provide reference to Sampling Field Sheets for detailed sampling information.
8. Describe sampling locations in detail and document all changes from project planning documents.
9. Provide a site sketch with sample locations and photo locations.
10. Maintain photo log by completing the stamped information at the end of the logbook.
11. If no site representative is on hand to accept the receipt for samples, an entry to that effect must be placed in the logbook.
12. Record I.D. numbers of COC and receipt for sample forms used. Also record numbers of destroyed documents.
13. Complete SMO information in the space provided.

Addition of 14-2582

1

U . S . EPA REGION IV

SDMS

Unscannable Material Target Sheet

DocID: 10079029 Site ID: FLD043055151

Site Name: Hew Site

Nature of Material:

Map:	✓	Computer Disks:	
Photos:		CD-ROM:	
Blueprints:		Oversized Report:	
Slides:		Log Book:	

Other (describe):

Amount of material: (1)

Please contact the appropriate Records Center to view the material.

Well Location	Depth	Diameter		Water Level	Volume		Time
AP-MW-01	15.15	4"		5.1'	[illegible]	2.1'	11:10
No readings on OVA at AP-MW-01							
AP-MW-07	15.20	4"		5.20'	6.5 gal (19.5 gal)	1.35'	13.50
No readings on OVA at AP-MW-07							
AP-MW-02 / AP-MW-05	Top of	Cancelled					
AP-MW-04	22.6'	2"		6.45'	(7.8) 8 gal	2.45'	1520
No OVA readings							
AP-MW-06	65.5'	2"		6.10'	30 gal	1.82'	
Grass in area is dead, W side				gypsum drainage ditch			1615
No readings OVA, M4 - 0.04 mR/h				Intermediate aquifer			
Area and water. Grass							
... S - from reading							
... (S4 -> S2)							
10/10/90							
AP-MW-03	21.15'	4"		5.25'	8 gal	1.60'	900
No reading HNU, M-4 0.06 mR/h							

M. Kerdt

M. Kerdt

5

Phosphate Products
Piney Point

1-800-238-5355
34221

~~Bradenton~~
231 US 301 Blvd East

Open until 6:30 AM

South 41 Tk. 301/41
301 past Desoto Mall
(2 to 3 miles on left)
Bear left on 301
Manatee Memorial - 1 mile
past
Middle School on left
Flea Market
Turk - Take right 301
Turk.
Gree

[redacted]

M. Wash

1

since the facility was
County water there
is no permitted well
for dwl.
There is a small
house on the plant's
property which they
will buy as of
Nov 1, 1990. Occupant
is gone, phone disconnected
. lives on east side
on Buckeye Rd will
be only one
There are 4 trailers
~50' SE of plant on
same side of street -
neighbors on adjacent
property is on wells.
Agric. - orange, tomatoes
beef

M. C.

Code	Location	Comments	Time
AP-SS-03	West of DAP pond. Between ditch & pond SE and L across pond acc. gypsum stack. Ditch - seepage	Pond elevated ~8' above Prop to ditch ~8' Dark brown, sandy, Some white (gypsum?)	1020
APSB-03	from gypsum stack M-4 logged -	Looks as if going through gypsum	1030
		Hit rock Move across ditch	1041
AP-SD-10	DAP pond by inlet for DAP	Dark gray granular	
AP-SB-03	Across drainage ditch - West side 7.5	Taken 1/2" leaves 7.5-8.0' b/s	1135
AP-TW-03		10' bls Dark brown water in ditch	1145
AP-SS-07	On top of gypsum stack East of DAP pond.	Gypsum, newly deposited	1150

M [illegible]

JM [illegible]

4

Code	Location	Comment	Time
AP-SS-06	Between seepage ditch and Cooling pond. By MW-06 20' North	Sprayers on stack in area. No HNu response.	1200
AP-SB-06	" "	4' w/ S. Brown sandy soil	1215
AP-SD-12	Drainage ditch W of gypsum stacks by MW-06	Dark brown water. Brown sandy SD.	1230
AP-~~SD~~ SWA4-06	downgradient side of outfall #002	lots of minnows	1440
AP-SD-06	" "	Brown sand with some shells	1445
AP-SW-07	Drainage ditch 002 20' upgradient of Hiway 41	lots of minnows	15[illegible]
AP-SD07	[illegible] Grey sand with some shell pieces	drainage ditch 002 20' upgradient of [illegible]	1500

M. [illegible]

M. [illegible]

11

Code	Location	Comment	Time
AP-SW 08	Piney Point Creek 20' North of County Line Road		1605
AP-SD-08	" " "	Light Brown	1610

13

No city found ! press RETURN to try again.

COVERAGE

Reference 25

STATE	COUNTY	STATE NAME	COUNTY NAME
12	57	Florida	Hillsborough Co
12	81	Florida	Manatee Co
12	103	Florida	Pinellas Co

CENTER POINT AT STATE : 12 Florida
COUNTY : 81 Manatee Co

Press RETURN key to continue...

REGION OF THE COUNTRY

Zipcode found: 33591 at a distance of 6.6 Km

STATE	CITY NAME	FIPSCODE	LATITUDE	LONGITUDE
FL	TERRA CEIA	12081	27.5767	82.5733

Press RETURN key to continue ...

CENSUS DATA

AMAX Phosphate
LATITUDE 27:37:24 LONGITUDE 82:31:54 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	0	0	0	0	0
S 2	0	0	0	0	0	0	0
S 3	0	0	0	172	0	0	172
S 4	0	0	0	0	185	0	185
S 5	0	0	0	435	36	2221	2692
S 6	0	0	0	0	0	445	445
S 7	0	0	0	72	0	0	72
S 8	0	0	0	0	0	0	0
RING TOTALS	0	0	0	679	221	2666	3566

Press RETURN key to continue ...

U.S. EPA REGION IV

SDMS

POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

*PLEASE CONTACT THE APPROPRIATE RECORDS CENTER TO VIEW THE MATERIAL

R-586-6-1-20

Accepted - 7/1/91
D. Canfield
further action

FINAL REPORT

SITE INSPECTION
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA
EPA ID #: FLD043055151

Prepared Under
TDD No. F4-9009-01
Contract No. 68-01-7346

Revision 0

FOR THE

WASTE MANAGEMENT DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

JUNE 24, 1991

HALLIBURTON NUS ENVIRONMENTAL CORPORATION
SUPERFUND DIVISION

Prepared By	Reviewed By	Approved By
Deborah Kristiansen	Greg Schank	Phil G. Blackwell
Deborah Kristiansen for Maureen M. Gordon, Ph.D. Project Manager	Greg Schank Assistant Regional Project Manager and Professional Geologist	Phil Blackwell Regional Project Manager

R-586-6-1-20

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Prepared By

Deborah Kristiansen

Deborah Kristiansen for
Maureen M. Gordon, Ph.D.
Project Manager

Reviewed By

Greg Schank

Greg Schank
Assistant Regional
Project Manager and
Professional Geologist

Approved By

Phil Blackwell

Phil Blackwell
Regional Project Manager

R-586-6-1-20

7/1/91
D Canfield
resolve

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Deborah Kristiansen for Maureen M. Gordon, Ph.D. Project Manager	Greg Schank Assistant Regional Project Manager and Professional Geologist	Phil Blackwell Regional Project Manager

NOTICE

The information in this document has been funded wholly by the United States Environmental Protection Agency (EPA) under Contract Number 68-01-7346 and is considered proprietary to the EPA.

This information is not to be released to third parties without the expressed or written consent of the EPA.

TABLE OF CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

The AMAX Phosphate Facility is located on approximately 670 acres, 6 miles north of Palmetto, Manatee County, Florida. Operations began at this facility in 1966. Currently, it is owned and operated by Royster Phosphates, Inc. Phosphate ore is transported to the facility, where it is converted to phosphoric acid and diammonium phosphate. Along with a gypsum/cooling pond complex, AMAX consists of sulfuric acid, phosphoric acid, and ammoniated fertilizer plants.

The potential for pollution of air and water are inherent in the production and use of fertilizers. The plant's process water has a low pH with a high concentration of inorganic by-products. In addition to high levels of radioactive particle emissions (including mostly uranium-236, uranium-238, radium-226), there are also elevated concentrations of arsenic, cadmium, chromium, lead, sodium, fluoride, manganese, iron, sulfate, and total dissolved particles. Also, air contamination from escaping dust and fumes from the plant's stacks can transmit airborne particulate pollutants and by-products. Additionally, the low pH of the process water causes the reaction of acid with fluoride impurities to produce gaseous hydrogen fluoride.

AMAX Phosphate is located in the Gulf Central Lowlands subdivision of the Atlantic (Gulf) Coastal Plain physiographic province and the southeast coastal plain hydrogeologic setting in northwest Manatee County, Florida. The facility is underlain by Miocene to Recent undifferentiated surficial sands, sandy limestone, and shells. These undifferentiated surficial deposits are 1 to 35 feet thick with an average depth to groundwater of 4 to 10 feet below land surface. The Miocene Hawthorn Group underlies the surficial aquifer system and ranges from 1 to 35 feet to a total of 356 to 400 feet thick. This formation acts as an upper confining unit for the underlying Floridan Aquifer System, which is a continuous sequence of carbonate rocks of generally high permeability.

Within the 4-mile radius of the facility, a portion of the population obtains potable water from shallow private or community wells completed in the surficial aquifer. Groundwater is also used for irrigation of farms and groves.

Surface water run-off from the facility is directed to a ditch system surrounding the waste source areas. These ditches can empty into one of two canals on either the northern or southern portion of the property. Currently, only the northern one is used for discharge by the plant. These canals empty into creeks, and both eventually flow into Tampa Bay to complete surface water migration pathway. Additionally, the surrounding area is composed of a large number of wetlands which also accept drainage from the site. Drainage from the wetlands flows into the Little Manatee River on the north and Tampa Bay on the west. The Manatee River also eventually empties into Tampa Bay. Fishing, boating, and bathing occur in these waters. Also, several state- or federally designated protected or endangered species have ranges in the area. In fact, there is a critical habitat for the endangered Florida manatee (Trichechus manatus) located 6.5 miles from AMAX. Since the plant is in a flood plain, there is also a potential threat from flooding during wet weather.

During this sampling investigation, 44 environmental samples were collected. These include soil, groundwater, sediment, and surface water samples. The only organic pollutants of concern detected in elevated quantities in soil were toluene and carbon disulfide. Carbon disulfide, a by-product in the sulfuric acid manufacturing process, was also found in one groundwater sample collected from an onsite monitoring well. No organic compounds of concern, which are associated with the processes at the plant, were found in either sediment or surface water samples.

A sample of newly deposited gypsum was analyzed. It contained the following metals: aluminum, barium, calcium, chromium, iron, lead, magnesium, manganese, nickel, selenium, and vanadium. Those inorganics of concern detected in elevated quantities in soil samples, and also found in the gypsum, were barium, cadmium, chromium, manganese, nickel, selenium, and vanadium. Only cadmium and manganese were detected in elevated quantities in one onsite groundwater sample. The primary EPA maximum contaminant level (MCL) for drinking water standards was exceeded for manganese in this sample. Although the quantity of arsenic was not elevated, the MCL was exceeded for it in one groundwater sample collected on site. Additionally, the secondary MCL for drinking water standards for iron (300ug/l) was exceeded in seven of the onsite groundwater samples.

Chromium, lead, and vanadium were detected in elevated quantities in a sediment sample collected from the drainage ditch, while the only surface water sample containing elevated amounts of inorganics, including cadmium, chromium, lead, manganese, nickel, and vanadium, was taken from the cooling pond. There was no evidence of migration of these contaminants along the surface water pathway.

Analysis for radioactive nuclides in soil samples revealed that the onsite soil sample contained an elevated amount of radium-226 but not radium-228. Also, the amount of this nuclide in the southern drainage pathway was more elevated than in the northern drainage pathway. Values of radium-226 and radium-228 were elevated for the gypsum sample. However, none of these values exceeded the National Council on Radiation Protection and Measurements (NCRP) maximum criteria for radium-226 deposition on agricultural land (40 pCi/g). For groundwater samples, the MCL for primary drinking water standards was exceeded for gross alpha particle activity (15 pCi/l) for the background and one onsite surficial aquifer monitoring well sample. Additionally, the combined radium-226, radium-228 MCL (5 pCi/l) was also exceeded for these two samples. This value for radium-226 was exceeded for the surface water sample collected in the southern drainage pathway too. Unlike the organic and inorganic results, the elevated radium-226 values for the surface water and sediment samples collected in the southern drainage pathway indicate migration of this nuclide from AMAX along the surface water pathway.

Because of the targets associated with the four contaminant pathways and the elevated quantities of contaminants found at AMAX Phosphate, FIT 4 recommends that this site be evaluated using the HRS (effective March 14, 1991).

1.0 INTRODUCTION

The HALLIBURTON NUS Environmental Corporation Region 4 Field Investigation Team (FIT) was tasked by the U.S. Environmental Protection Agency (EPA), Waste Management Division to conduct a Site Inspection (SI) at the AMAX Phosphate Facility in Palmetto, Manatee County, Florida. The investigation was performed under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). The task was performed to satisfy the requirements stated in Technical Directive Document (TDD) number F4-9009-01. The field investigation was conducted the week of October 16, 1990.

1.1 OBJECTIVES

The objectives of this inspection were to determine the nature of contaminants present at the site and to determine if a release of these substances has occurred or may occur. Further, this inspection sought to determine the possible pathways by which contamination could migrate from the site and the populations and environments it would potentially affect. Through these objectives, a recommendation was made regarding future activities at the site.

1.2 SCOPE OF WORK

The objectives were achieved through the completion of a number of specific tasks. These activities were to:

- Obtain and review relevant background materials.
- Obtain information on local water systems.
- Determine location of and distance to nearest potable well.
- Evaluate potentially affected populations and environments associated with the groundwater, surface water, air, and soil exposure pathways.

- Develop a site sketch, to scale.

- Collect environmental samples.

2.0 SITE CHARACTERIZATION

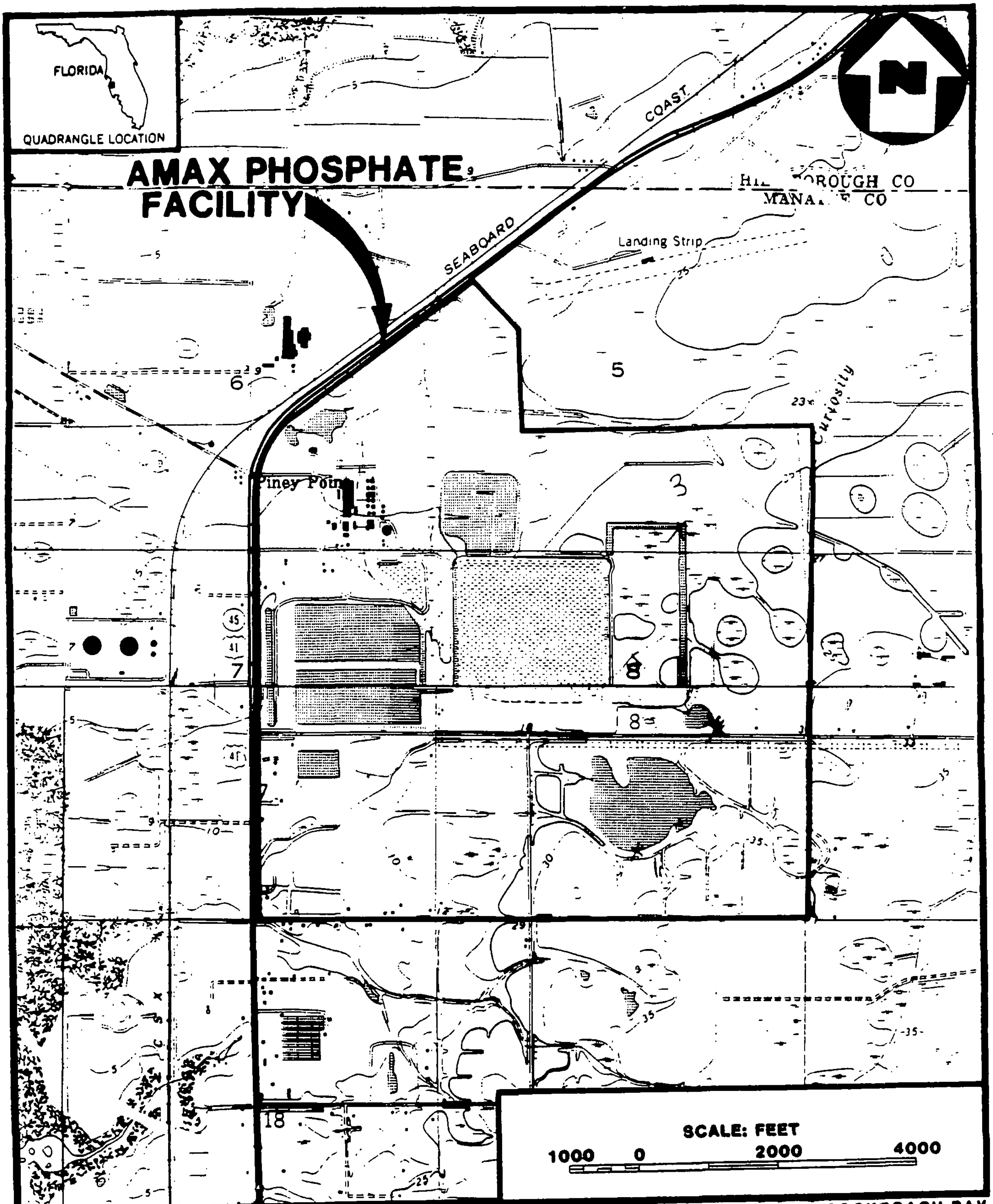
2.1 SITE HISTORY

The AMAX Phosphate Facility, Piney Point Complex site is located on approximately 670 acres, 6 miles north of Palmetto, in the northwestern corner of Manatee County, Florida (Appendix A). Phosphate ore is transported to AMAX, where it is converted to phosphoric acid and diammonium phosphate (DAP). This facility includes sulfuric acid, phosphoric acid, and ammoniated fertilizer plants along with a gypsum stack/cooling pond complex (Ref. 1). A site location map appears in Figure 1.

AMAX began operations at the facility in 1966 and expanded in 1978 (Ref. 1). It was then sold to Consolidated Minerals, Inc. of Plant City, Florida, at an unknown date, some time after February 1987 (Refs. 1, 2). At the end of 1988, Royster Phosphates, Inc. purchased the facility from Consolidated (Ref. 3). On November 1, 1990, Royster sold the plant to Atlantic Fertilizer Company as a joint venture with Gulf Atlantic; however, Royster is still responsible for the facility's management (Ref. 4).

The plant has been permitted by the Florida Department of Environmental Regulation (FDER) to discharge process and nonprocess wastewater into two drainage ditches. Outfalls 001 and 003, to the south of the facility, flow into a drainage ditch which empties into Bishop Harbor, an outlet to Tampa Bay, while Outfall 002, to the north, drains into a ditch which discharges into Piney Point Creek, then into Tampa Bay (Ref. 5). Outfalls 001 and 002 are for nonprocess water, while Outfall 003 is for treated process water. Outfall 001 was used for the last time in September 1989, and 003 was last used in March 1989. Presently, Outfall 002 is the only one used. All three outfalls are still permitted (Refs. 4, 6).

In 1982, a study was conducted by the U.S. Geological Survey on the effect of groundwater contamination in the area of gypsum stacks. The following contaminants were present in excess of primary drinking water standards at AMAX: silver, arsenic, chromium, cadmium, lead, fluoride, and selenium. Elevated levels of these inorganics in the groundwater extended to 50 feet beyond the stacks for silver, lead, fluoride, and selenium; to 200 feet for arsenic and cadmium; and to 300 feet for arsenic and cadmium; and to 300 feet for chromium (Ref. 1, p. 6, Tables 2, 3). Additionally, a groundwater monitoring plan was submitted to the FDER, Southwest District, in September 1983, and issued in September 1985, but was withdrawn in October 1985. After the company collected and submitted more information, the second permit was issued in March 1987. During this monitoring, groundwater quality problems, which include the following quantities exceeding primary drinking



BASE MAP IS A PORTION OF THE U.S.G.S. 7.5 MINUTE QUADRANGLE PALMETTO 1987, COCKROACH BAY 1981, FLORIDA.

SITE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 1

NUS CORPORATION

water standards, were noted in 1988: sodium (180 mg/l), sulfate (745 mg/l), total dissolved solids (TDS) (1586 mg/l), manganese (0.31 mg/l), and iron (2.9 mg/l) (Ref. 1).

2.2 SITE DESCRIPTION

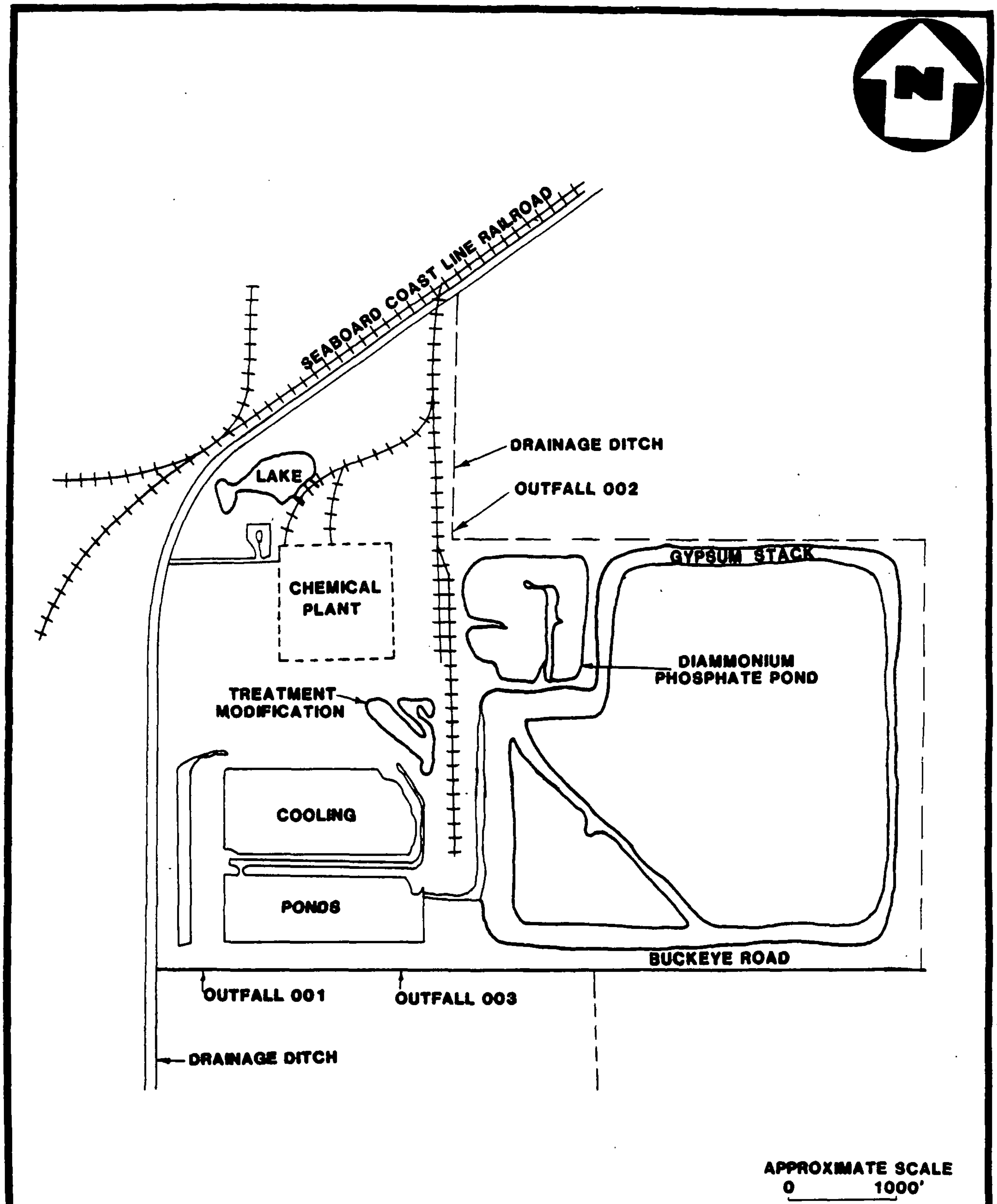
2.2.1 Site Features

AMAX Phosphate is a phosphoric acid complex situated on approximately 670 acres of flat terrain. It is bordered on the west by Highway 41, on the south by Buckeye Road and a citrus grove, on the east by farmland, and on the north by the Manatee Airport, a landing strip. A drainage ditch for nonprocess water on the northern border empties into Piney Point Creek and then into Tampa Bay approximately 2 miles west of the facility, while a drainage ditch along the southern border empties into Bishop Harbor 1 mile to the west, and this also converges with the bay (Appendix A). The plant is fenced on the western, northern, and eastern borders with a guardhouse to the north. Access can be gained by foot on Buckeye Road at the southern border (Ref. 4).

As stated in the preceding section, the complex includes several parts associated with the manufacturing process. An approximately 5-acre manufacturing portion, located to the northwest, consists of sulfuric acid, phosphoric acid, and DAP plants. The largest portion of the property is used for gypsum stacks, the calcium sulfate by-product from the phosphoric acid process, which occupy approximately 253 acres on the southeast. The stacks are surrounded by a drainage ditch that channels water from the stacks back to the plant and also inhibits lateral migration of leachate from the gypsum. There is also a 32-acre DAP pond in the northwest corner of the gypsum stack area, while a 77-acre cooling pond is located in the southwestern corner. Additionally, there is a 1-acre, ammonia removal pond northeast of the cooling pond. Process and nonprocess water, along with gypsum, are pumped to waste disposal areas on the facility, and a network of drainage ditches ultimately leads to the two ditches mentioned above. Railroad tracks, with a spur going into the plant on the northern border of the property, are located along the western border (Ref. 4). A site layout map appears in Figure 2.

2.2.2 Waste Characteristics

The main products which AMAX produces and sells are phosphoric acid and the fertilizer, DAP. In order to make these products, the plant first manufactures sulfuric acid which is used to digest the phosphate ore. The phosphoric acid, produced in this process, is then reacted with ammonia to yield the final product, DAP. AMAX manufactures 2,000 tons of sulfuric acid per day by burning sulfur in air in the presence of a catalyst. Then, the sulfur oxide formed is absorbed in water to produce the



SITE LAYOUT MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 2

NUS CORPORATION

acid. Brink mist eliminators in towers remove escaping acid mist and sulfur oxide before they are released into the environment. This facility's sulfuric acid plant is the largest single-unit plant in the world. Besides using all of the acid it produces, AMAX purchases an additional 300 tons per day.

Phosphate rock is purchased from a mine in Hillsborough County, Florida. It is crushed and slurried with sulfuric acid. The resulting slurry is filtered to remove the phosphoric acid, formed in the process, from the calcium sulfate or gypsum. The latter is pumped to a gypsum stack/cooling pond complex. The acid formed during this process is concentrated to 54 percent. Impurities in the acid are removed and shipped out of the plant in tanks. The process water from this production has an acidic pH between 1.8 and 2.0. It is used to transport the gypsum to the top of the stack and is recirculated to the plant (Refs. 4, 7). Exhaust from the production is washed with recycled water to remove harmful gases before it is discharge from the stack (Refs. 4, 7).

In order to produce DAP 18-46-0, anhydrous ammonia, phosphoric acid, and 75 percent phosphate rock are mixed together. The resulting slurry is pumped to a solid-materials handling system where the aqueous portion is removed, and the DAP is dried. This plant is one of the largest of its kind in the world. Scrubbers inhibit dust and fumes from being released into the atmosphere. The final product is either used directly as fertilizer or is processed further by other fertilizer plants (Refs. 4, 7).

In the production of DAP and phosphoric acid, gases and particulates are captured by water stream scrubbers. This water is recirculated and reused in production processes. Water is used to slurry the gypsum, and after depositing the gypsum, this water is also recirculated. Once water has come in contact with either the gaseous emissions, dust, or gypsum, it is contaminated and cannot be released by the plant; therefore, excess water is kept in holding ponds. In order to minimize the volume of water, there is an evaporation system consisting of sprayers in the holding areas. During the rainy season when accumulation is increased, water is treated before it is released from the site. Before releasing the water, fluorides and phosphorous products are removed as solids and deposited on the gypsum stacks, and the acidic pH is neutralized with lime (Refs. 4, 7).

The potential for pollution of air and water is inherent in the production and use of fertilizers. The impurities resulting from these manufacturing processes can be inadvertently released into the environment through several pathways and consist of a variety of substances. The plant process water characteristically has a low pH and contains a high concentration of inorganic by-products from the phosphate rock. In addition to high levels of radioactive particle emissions (including mostly uranium-238, radium-226), there are also elevated concentrations of arsenic, cadmium, chromium, lead, sodium, fluoride, manganese, iron, sulfate, and TDS. A study conducted by the Environmental Protection Agency (EPA) indicated that only radium-226, uranium-238, chromium, and arsenic were present in large enough quantities in phosphogypsum to exceed health-based screening limits (Ref. 8, pp. 12-6, 12-7). Leachate, however, has a higher concentration of contaminants of concern. It was found that the following concentrations of metals in leachate provided a potential health or environmental risk if released into either groundwater or surface water: arsenic, lead, cadmium, chromium, fluoride, zinc, antimony, copper, thallium, nickel, iron, silver, and mercury (Ref. 8, pp. 12-8, 12-9).

Unless the gypsum stacks and cooling ponds are underlain with an impervious liner, contaminants can be discharged to groundwater; however, the soils under the stacks can neutralize or buffer the pH causing some contaminants to precipitate from solution and thus attenuate their migration (Refs. 1; 8; 9, pp. 7, 10; 10, pp. 105-108, 114-119). Also, phosphates, when released into the environment, increase algal growth in surface water which upsets the natural biological balance (Ref. 11, p. 471). Because of the low pH of the process water, some of the fluorides are converted to gaseous hydrogen fluoride and transmitted into the environment during the sprinkling involved with the evaporation process on the gypsum stacks. Fluorides have been periodically found in citrus tree foliage and grass used for cattle grazing in the area (Ref. 4). Additionally, escaping dust and fumes from the plant's stacks can transmit airborne particulate pollutants and by-products.

3.0 REGIONAL POPULATIONS AND ENVIRONMENTS

3.1 POPULATION AND LAND USE

3.1.1 Demography

AMAX Phosphate Facility is located in a sparsely populated area that is mainly used for agriculture and heavy industry (Ref. 4, Appendix A). The total population within a 4-mile radius is 3,817 with the following distribution: 251 between 0 and 1 mile (3.8 residents/residence x number of residences), 679 between 1 and 2 miles, 221 between 2 and 3 miles, and 2,666 between 3 and 4 miles (Ref. 12, Appendix A). There are no schools within 4 miles of the facility (Appendix A).

3.1.2 Land Use

The area to the west of AMAX is predominantly industrial with Port Manatee 1.5 miles to the west. There is a landing strip, Manatee Airport, directly to the north. The immediate area to the south consists of a citrus grove, while there is a cattle ranch and turf farm to the west. The closest neighbors are located in four trailers 50 feet east of the gypsum stacks. The area surrounding the facility is also composed of a large concentration of wetlands (Refs. 4, 13, Appendix A). During the investigation, stressed vegetation was noted along the plant's borders. Also, at times large volumes of smoke were seen emitting from the facility's stacks (Refs. 4, 13). A number of species, having either state or federal protection status, inhabit the area (Ref. 14).

3.2 SURFACE WATER

3.2.1 Climatology

The climate in Manatee County is characterized by long, warm, humid summers and short, mild winters. Average monthly temperatures range from 61°F in January to 82°F in July and August with an average annual temperature of 73°F. Although some rainfall occurs during every month, the season with the highest rainfall extends from June through September (Ref. 15, p. 11). The net annual rainfall is 4 inches (Ref. 16, pp. 43, 63), while the 1-year, 24-hour rainfall is also 4 inches (Ref. 17, p. 93).

3.2.2 Overland Drainage

Surface water run-off from the facility is directed to a ditch system surrounding the waste source areas. These ditches, which accept process and nonprocess water, eventually drain into two canals, one to the north and one running parallel to Buckeye Road on the south. Formerly, two outfalls, 001 and 003 for nonprocess and process water respectively, emptied into the latter canal. This canal also receives drainage from the agricultural land on the west. It flows under Highway 41 and converges with a railroad canal. This canal enters a creek leading to Bishop Harbor 1 mile west of the site, and Bishop Harbor flows into Tampa Bay 1 mile downgradient from this point. Outfall 002, for nonprocess water, is currently in use. It enters a canal on the northern part of the site and flows west under Highway 41 into Piney Point Creek 2,500 feet from AMAX. This creek converges with Tampa Bay 2 miles northwest of the plant (Refs. 4, 13, Appendix A). Additionally, the surrounding area is composed of a large number of wetlands which may accept drainage from the site. Eventually, these wetlands drain into small creeks that also flow toward Tampa Bay to the west and the Little Manatee River 5 miles to the north. This river also empties into Tampa Bay (Appendix A).

3.2.3 Potentially Affected Water Bodies

During the site investigation, people were seen fishing in Bishop's Creek which accepts run-off from the canal south of the plant (Ref. 4, p. 23). Also, Bishop's Harbor is often used for recreational fishing (Ref. 6). The Tampa Bay area supports additional recreational activities such as boating and swimming (Ref. 4, Appendix A). The Manatee County Water Department obtains water from Lake Manatee, which is not on the surface water migration pathway. The remainder of the people obtain potable water from private or community wells; therefore, there are no intakes along the surface water migration pathway (Ref. 4). Part of the plant, along with the area to the west toward Tampa Bay, is on a flood plain. During flooding, the migration of contaminants from the site to the surface water system would be enhanced (Ref. 18). Several state- and federally protected or endangered species inhabit the area (Refs. 8, pp. 12-17, 12-18; 14). In fact, the endangered Florida manatee (Trichechus manatus) is often sighted in the Little Manatee River (Ref. 4). A critical habitat for this species is located 6.5 miles from the plant (Ref. 8, pp. 12-17, 12-18).

3.3 GROUNDWATER

3.3.1 Hydrogeology

The AMAX Phosphate Facility is located in the Gulf Central Lowlands subdivision of the Atlantic (Gulf) Coastal Plain physiographic province and the southeast coastal plain hydrogeologic setting in northwest Manatee County, Florida (Refs. 15, p. 105; 19, plate 28; 20, pp. 277-278). Elevations at the facility range between 8 and 35 feet above mean sea level (amsl) (Appendix A). The major soil types in the area of the facility include the Palmetto, Wabasso, Eau Gallie, and Bradenton fine sands and the Chobee loamy fine sand (Ref. 21, plates 1, 5).

The facility is underlain by Miocene to Recent undifferentiated surficial sands, sandy limestone, and shells whose composition may vary laterally and vertically. These undifferentiated surficial deposits range between approximately 1 to 35 feet thick, and comprise the unconfined surficial aquifer system (Refs. 15, p. 129; 22, p. 62). The average depth to the water table in the area of the facility ranges between 4 and 10 feet below land surface (bls) (Ref. 4). The water table forms a subdued replica of the topographic surface in the area. Seasonal fluctuations of water levels in the surficial aquifer are generally less than 5 feet and are very dependent upon the availability of water (Ref. 15, p. 129). Transmissivity values of the surficial aquifer in Manatee County range from less than 267 to approximately 5,304 ft^2/day (Ref. 15, Table 3, p. 35, p. 129). Estimates of storage coefficients of the surficial aquifer range between 0.05 and 0.12, based on laboratory specific-yield tests of sands, sandy limestone, and shells of similar composition to those in the surficial aquifer in Manatee County (Ref. 15, p. 131).

The Miocene Hawthorn Group underlies the surficial aquifer system. The Hawthorn Group ranges between 1 to 35 feet bls and ranges between 356 and 400 feet thick in the facility area (Refs. 15, p. 129; 22, Figure 38, p. 62). The Arcadia Formation and the Tampa Member of the Arcadia Formation comprise the Hawthorn Group in the area of the facility (Ref. 22, Figure 38, p. 62). The Arcadia Formation consists of limestone and dolostone containing varying amounts of quartz sand, clay, and phosphate grains. Sand lenses composed of very fine- to medium-grained quartz sand occur irregularly throughout the formation and are usually less than 5 feet thick. Discontinuous clay lenses also occur sporadically throughout the Arcadia Formation. The clay lenses are generally less than 5 feet thick and are composed of quartz sandy, silty, phosphatic, and dolomitic clays (Ref. 22, p. 58). The Arcadia Formation is approximately 221 feet thick in the area of the facility (Ref. 22, Figure 38, p. 62).

The Tampa Member of the Arcadia Formation is composed primarily of limestone with minor dolomite, sands, and clays. The Tampa Member is approximately 135 feet thick in the area of the facility. The texture and composition of the limestones range from mudstones to packstones. The dolostones range from microcrystalline to very fine-grained in texture and are quartz sandy and clayey in composition with minor to no phosphate. Sand and clay beds occur occasionally within the Tampa Member and are similar in composition and thickness as those found in the overlying Arcadia Formation, except for a significantly lower phosphate content (Ref. 22, p. 70).

The Hawthorn Group acts as an upper confining unit for the underlying Floridan Aquifer System. The rocks that comprise the upper confining unit vary greatly in lithology and are complexly interbedded. Clay beds found in the Hawthorn Group act as very effective confining beds. Vertical hydraulic conductivity values for Hawthorn Group clays, as established from aquifer tests and core samples, range between 5.29×10^{-6} and 2.75×10^{-10} cm/sec (1.5×10^{-2} and 7.8×10^{-7} ft/day) (Ref. 23, p. B-43).

The Oligocene Suwannee Limestone underlies the Hawthorn Group. The Suwannee Limestone is composed of hard, yellow to creamy, fossiliferous limestones. The upper part of the Suwannee Limestone contains thin, discontinuous chert lenses; the basal portion is interbedded with quartz sand and dolomite. The Suwannee Limestone ranges up to approximately 300 feet thick (Refs. 15, p. 28; 23, pp. B-32, B-33).

The Eocene Ocala Limestone underlies the Suwanee Limestone. The Ocala Limestone consists of three units: the Crystal River Member, the Williston Member, and the Inglis Member. All three members are composed of cream to white fossiliferous limestone interbededded with chert beds. The Inglis Member of the Ocala Limestone often contains gray to brown dolomite. The Ocala Limestone ranges between 300 and 600 feet thick (Refs. 15, p. 28; 23, p. B-30).

The Eocene Avon Park Formation underlies the Ocala Limestone. The Avon Park Formation consists of brown fossiliferous limestone. The upper portion of the Avon Park Formation occasionally contains layers of carbonaceous material or peat, and the basal portion may contain small evaporite lenses. The Avon Park Formation may be greater than 1,000 feet thick (Refs. 15, p. 28; 23, pp. B-25, B-27).

The Lower Eocene Oldsmar Formation underlies the Avon Park Formation. The Oldsmar Formation consists of micritic to finely pellital limestone thinly interbedded with fine- to medium-crystalline, vuggy dolomite. The basal portion of the formation is usually more extensively dolomitized than the upper portion and contains pore-filling gypsum deposits and thin beds of anhydrite. The Oldsmar Formation and other lower Eocene carbonate rocks are approximately 1,500 feet thick (Ref. 23, pp. B-22-B-23, plates 3, 33).

The Floridan Aquifer System is a vertically continuous sequence of carbonate rocks of generally high permeability that ranges from late Paleocene to early Miocene age. Less permeable carbonate rocks separate the aquifer system into two aquifers: the Upper and Lower Floridan aquifers (Ref. 23, p. B-45). The Upper Floridan aquifer is composed of the lower portion of the Tampa Member of the Arcadia Formation (Hawthorn Group), the Suwannee Limestone, the Ocala Limestone, and the Avon Park Formation (Ref. 23, pp. B-44, B-47). The top of the Upper Floridan aquifer ranges from 357 to 400 feet bls in the area of the facility (Refs. 22, p. 62; 23, plate 26). The Upper Floridan aquifer is approximately 1,250 feet thick (Ref. 23, plate 28). Transmissivity values range from approximately 4,900 to 160,000 ft^2/day (Ref. 15, p. 137). The storage coefficients of the Upper Floridan aquifer in Manatee County range from 2.0×10^{-4} to 2.0×10^{-3}. Leakage to the Upper Floridan aquifer is estimated to range from 4.0×10^{-5} to 2.7×10^{-3} ft/day) (Ref. 15, p. 137). The base of the Upper Floridan aquifer is located at approximately -1,650 amsl (Ref. 23, plate 29). The Avon Park Formation is the deepest potable, water-bearing formation in the Upper Floridan aquifer (Ref. 15, p. 28).

3.3.2 Aquifer Use

Within a 4-mile radius of AMAX, the majority of people to the southwest, obtain potable water from the Manatee County Water Department. The remaining people receive water from either private or community wells (Refs. 4, 24, 25). A house count using topographic maps indicates that there are 251 residences using wells within 3 miles of the facility with an additional 260 within 3 to 4 miles (Appendix A). The majority of these wells are completed in the surficial aquifer. Groundwater is also used for irrigation of the farms and groves (Ref. 25).

4.0 FIELD INVESTIGATION

4.1 SAMPLE COLLECTION

During the field investigation, conducted the week of October 15, 1990, FIT 4 attempted to identify and characterize contaminants which may be present in the environment as a result of activities that were conducted at AMAX Phosphate Facility. To accomplish this, FIT 4 collected environmental surface soil, subsurface soil, sediment, surface water, and groundwater samples from a number of strategic locations. These locations were selected based on historical information, hydrogeological data for the region and site area, and direct observation at the site.

4.1.1 Sample Collection Methodology

All sample collection, sample preservation, and chain-of-custody procedures used during this investigation were in accordance with the standard operating procedures as specified in Sections 3 and 4 of the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division, April 1, 1986.

4.1.2 Duplicate Samples

Duplicate samples were offered to and declined by Ivan Nance, a designated representative of Royster Phosphates, Inc. Receipt for sample forms are on file at FIT 4.

4.1.3 Description of Samples and Sample Locations

During the sampling investigation, a total of 44 environmental samples were collected. The samples collected in each media include the following: six surface soil and one gypsum, six subsurface soil, nine surface water, 11 sediment, five groundwater from temporary wells, five groundwater from existing monitoring wells, and one groundwater from a private well. Subsurface soil samples were collected 4 to 10 feet below land surface (bls) at the zone of saturation. Groundwater samples were taken from the same depths.

Four sets of surface soil, subsurface soil, and groundwater samples were taken in conjunction with each other. Two of these sets, one collected to the north of AMAX (AP-SS-01, AP-SB-01, AP-TW-01) and one to the east (AP-SS-02, AP-SB-02, AP-TW-02) served to establish background conditions. The remaining two sets were collected near waste source areas to determine migration of contaminants. One was taken southwest of the chemical plant (AP-SS-04, AP-SB-04, AP-TW-04) and the other west of the cooling pond (AP-SS-05, AP-SB-05, AP-TW-05). Another surface soil sample was taken near the diammonium phosphate (DAP) pond (AP-SS-03) with the subsurface and groundwater samples (AP-SB-03, AP-TW-03) collected a few feet to the west of the corresponding surface soil sample. A final set of soil samples (AP-SS-06, AP-SB-06) was collected between the cooling pond and drainage ditch. In order to characterize the contaminants in gypsum, a freshly deposited sample (AP-SS-07) was removed from the gypsum stacks.

Nine sets of surface water and sediment samples were collected in conjunction with each other. Two sets, one collected north of the site in the Little Manatee River (AP-SW-01, AP-SD-01) and the other southeast of the facility in Cabbage Slough Creek (AP-SW-02, AP-SD-02) served to establish background conditions. In order to characterize contaminants, two sets were taken from source areas, the cooling (AP-SW-09, AP-SD-09) and ammonia removal (AP-SW-11, AP-SD-11) ponds. Five sets were collected from locations to determine if pollutants were migrating from the facility. Two of these were taken along the drainage pathway of outfalls 001 and 003, which are no longer in use. One set (AP-SW-04, AP-SD-04) was collected downgradient from the outfalls in the drainage ditch and the other (AP-SW-05, AP-SD-05) at the confluence of the ditch and Bishop Creek. The remaining three sets were collected in the drainage pathway of Outfall 002. One of these (AP-SW-06, AP-SD-06) was taken in the drainage ditch downgradient from the outfall, another (AP-SW-07, AP-SD-07) a few feet west, and the third (AP-SW-08, AP-SD-08) in Piney Point Creek. A tenth sediment sample (AP-SD-10) was also collected from the DAP pond to characterize contaminants, and another (AP-SD-12) was taken from the drainage ditch by the gypsum stacks to determine migration of contaminants from the stacks.

Five groundwater samples were collected from existing monitoring wells to determine if contaminants had migrated into the groundwater. Four of these samples (AP-MW-01, AP-MW-03, AP-MW-04, AP-MW-05; 12.5 - 20.15 feet bls) were from wells installed in the surficial aquifer and the fifth from a well installed in the the intermediate aquifer (AP-MW-06; 63.7 feet bls). Also, a private well (AP-PW-01) to the east of AMAX was sampled. Sample codes, descriptions, locations, and rationale are contained in Tables 1, 2, and 3. Sample locations are shown in Figures 3, 4, and 5.

TABLE 1

SAMPLE CODES, DESCRIPTIONS, LOCATIONS, AND RATIONALE
SOIL SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Description	Location	Rationale
AP-SS-01	Surface Soil	West side of Manatee Airport Road, 2,000 feet feet north of AMAX	Establish background conditions
AP-SS-02	Surface Soil	East of gypsum stacks 50 feet from AMAX	Establish background conditions
AP-SS-03	Surface Soil	West side of DAP pond, between drainage ditch and pond	Determine migration of contaminants
AP-SS-04	Surface Soil	Southwest corner of chemical plant, west of fence	Determine migration of contaminants
AP-SS-05	Surface Soil	West of cooling pond between drainage ditch and rainwater pond	Determine migration of contaminants
AP-SS-06	Surface Soil	Between drainage ditch and cooling pond	Determine migration of contaminants
AP-SS-07	Gypsum	Gypsum stacks	Characterize contaminants
AP-SB-01	Subsurface Soil	In conjunction with AP-SS-01, collected 4' bls	Establish background conditions
AP-SB-02	Subsurface Soil	In conjunction with AP-SS-02, collected 4' bls	Establish background conditions
AP-SB-03	Subsurface Soil	West of DAP pond and drainage ditch, collected 8' bls	Determine migration of contaminants
AP-SB-04	Subsurface Soil	In conjunction with AP-SS-04, collected 4' bls	Determine migration of contaminants
AP-SB-05	Subsurface Soil	In conjunction with AP-SS-05, collected 10' bls	Determine migration of contaminants
AP-SB-06	Subsurface Soil	In conjunction with AP-SS-06, collected 4' bls	Determine migration of contaminants

AP - AMAX Phosphate Facility
SS - Surface Soil
SB - Subsurface Soil

TABLE 2

SAMPLE CODES, DESCRIPTIONS, LOCATIONS, AND RATIONALE
GROUNDWATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Description	Location	Rationale
AP-TW-01	Groundwater	In conjunction with AP-SS-01, collected 7' bls	Establish background conditions
AP-TW-02	Groundwater	In conjunction with AP-SS-02, collected 4' bls	Establish background conditions
AP-TW-03	Groundwater	In conjunction with AP-SS-03, collected 10' bls	Determine migration of contaminants
AP-TW-04	Groundwater	In conjunction with AP-SS-04, collected 4' bls	Determine migration of contaminants
AP-TW-05	Groundwater	In conjunction with AP-SS-04, collected 10' bls	Determine migration of contaminants
AP-MW-01*	Groundwater	Southeast corner of plant, surficial aquifer, 15.2' bls	Determine migration of contaminants
AP-MW-03	Groundwater	East of chemical plant, surficial aquifer, 21.2' bls	Determine migration of contaminants
AP-MW-04	Groundwater	North of cooling ponds, surficial aquifer, 22.6' bls	Determine migration of contaminants
AP-MW-05	Groundwater	South of Buckeye Road, surficial aquifer, 15.2' bls	Determine migration of contaminants
AP-MW-06	Groundwater	West of gypsum stack drainage ditch, intermediate aquifer, 65.5' bls	Determine migration of contaminants
AP-PW-01	Groundwater	West of gypsum stacks, 50 feet east of AMAX	Determine migration of contaminants

AP - AMAX Phosphate Facility
TW - Groundwater, Temporary Well
MW - Groundwater, Monitoring Well
* AP-MW-02 was not collected.

TABLE 3

SAMPLE CODES, DESCRIPTIONS, LOCATIONS, AND RATIONALE
SURFACE WATER AND SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Description	Location	Rationale
AP-SW-01	Surface Water	Little Manatee River 5 miles north of AMAX	Establish background conditions
AP-SW-02*	Surface Water	Cabbage Slough Creek 1.5 miles east of AMAX	Establish background conditions
AP-SW-04	Surface Water	Southwest corner of AMAX in drainage ditch downgradient from outfalls 001 and 003	Determine migration of contaminants
AP-SW-05	Surface Water	Confluence of drainage ditch and Bishop Creek	Determine migration of contaminants
AP-SW-06	Surface Water	Drainage ditch downgradient from Outfall 002	Determine migration of contaminants
AP-SW-07	Surface Water	Drainage ditch downgradient from Outfall 002 east of Highway 41	Determine migration of contaminants
AP-SW-08	Surface Water	Piney Point Creek 20 feet north of County Line Road	Determine migration of contaminants
AP-SW-09*	Surface Water	East end of cooling pond	Characterize contaminants
AP-SW-11	Surface Water	West end of ammonia removal pond	Characterize contaminants
AP-SD-01	Sediment	In conjunction with AP-SW-01	Establish background conditions
AP-SD-02*	Sediment	In conjunction with AP-SW-02	Establish background conditions
AP-SD-04	Sediment	In conjunction with AP-SW-04	Determine migration of contaminants
AP-SD-05	Sediment	In conjunction with AP-SW-05	Determine migration of contaminants
AP-SD-06	Sediment	In conjunction with AP-SW-06	Determine migration of contaminants

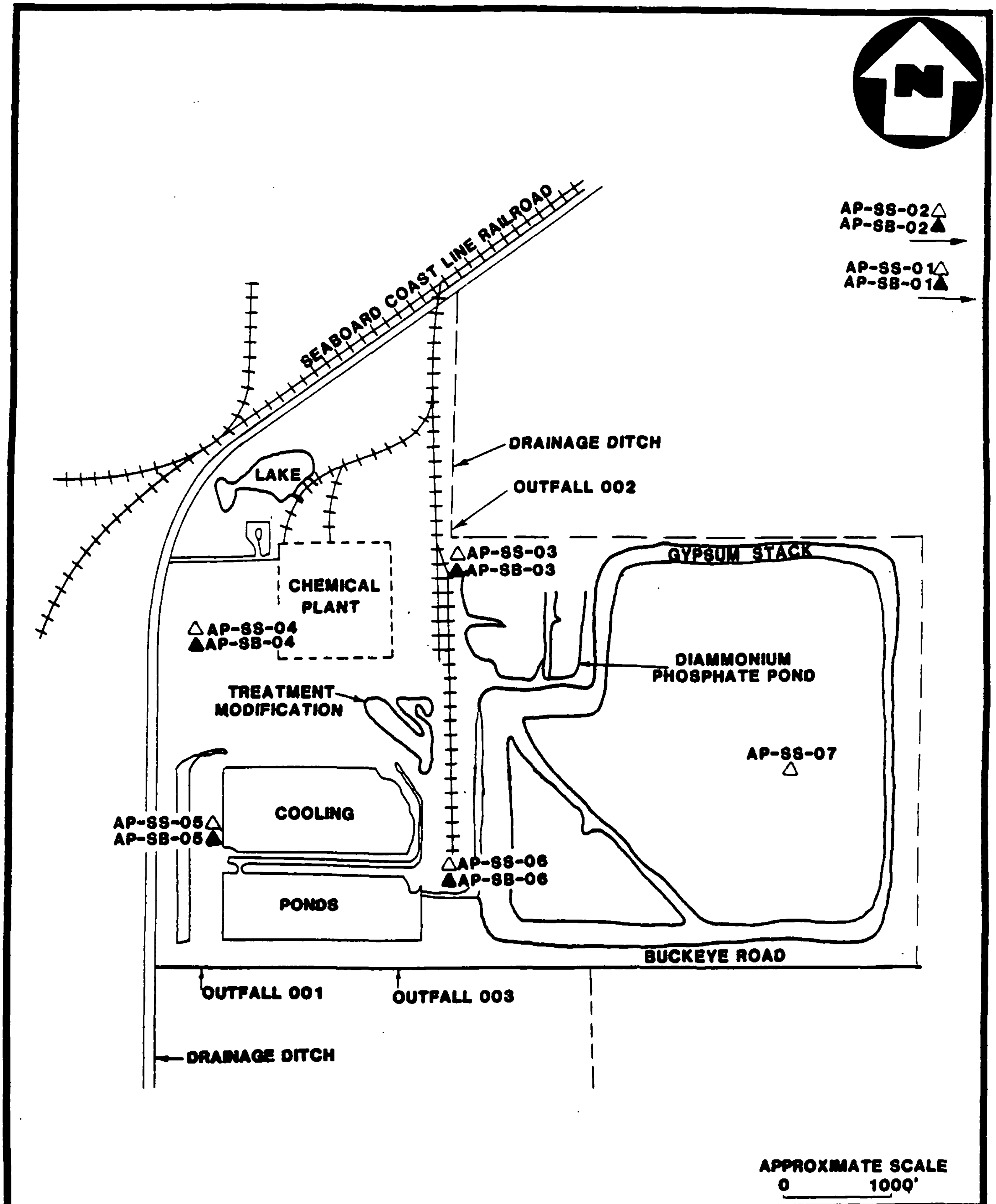
AP - AMAX Phosphate Facility
SW - Surface Water
SD - Sediment
* AP-SW-03, AP-SW-10, and AP-SD-03 were not collected.

TABLE 3

SAMPLE CODES, DESCRIPTIONS, LOCATIONS, AND RATIONALE
SURFACE WATER AND SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Description	Location	Rationale
AP-SD-07	Sediment	In conjunction with AP-SW-07	Determine migration of contaminants
AP-SD-08	Sediment	In conjunction with AP-SW-08	Determine migration of contaminants
AP-SD-09	Sediment	In conjunction with AP-SW-09	Characterize contaminants
AP-SD-10	Sediment	DAP pond by waste inlet	Characterize contaminants
AP-SD-11	Sediment	In conjunction with AP-SW-11	Characterize contaminants
AP-SD-12	Sediment	Drainage ditch west of gypsum stacks	Determine migration of contaminants

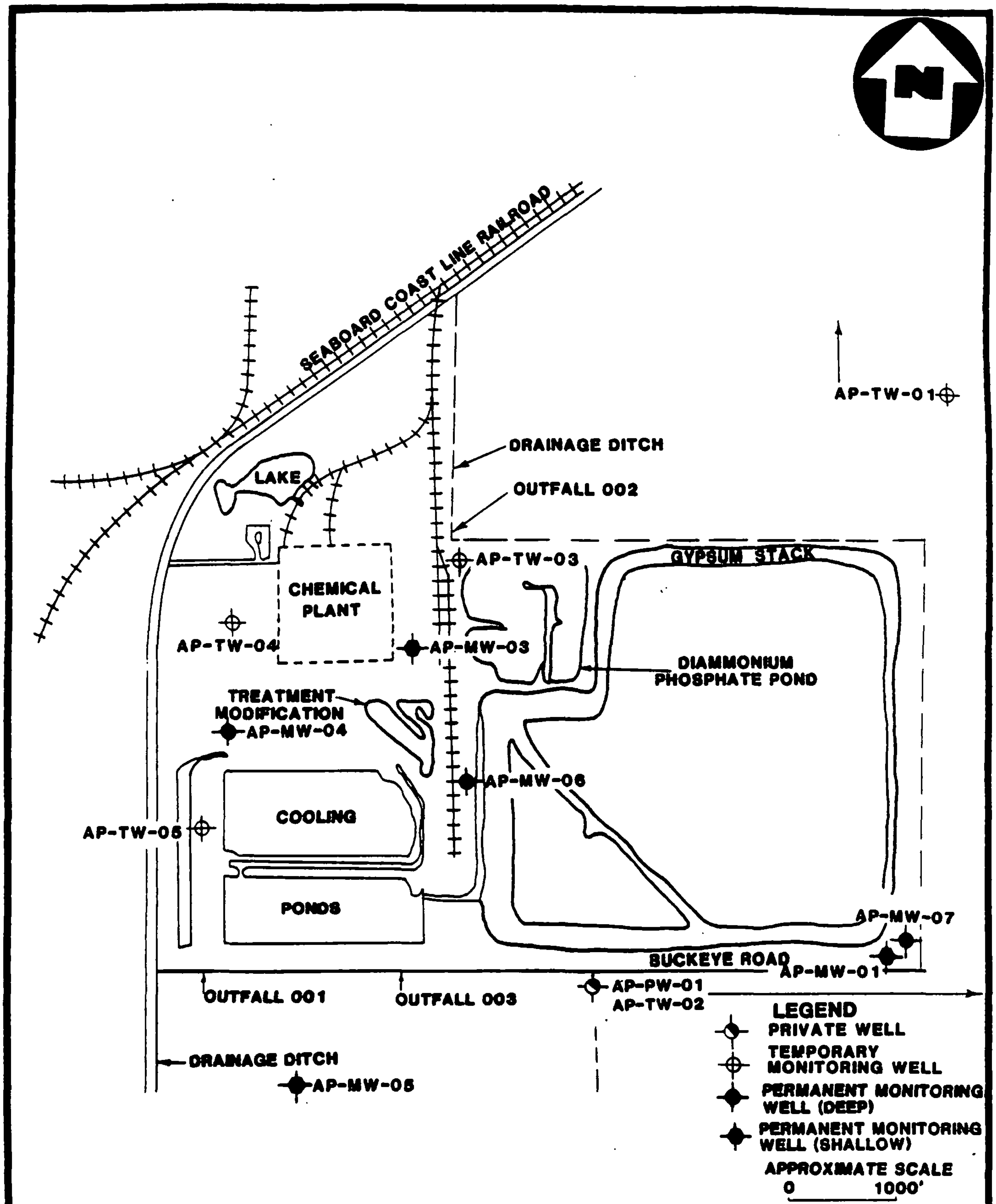
AP - AMAX Phosphate Facility
SW - Surface Water
SD - Sediment
* AP-SW-03, AP-SW-10, and AP-SD-03 were not collected.



SOIL SAMPLE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 3

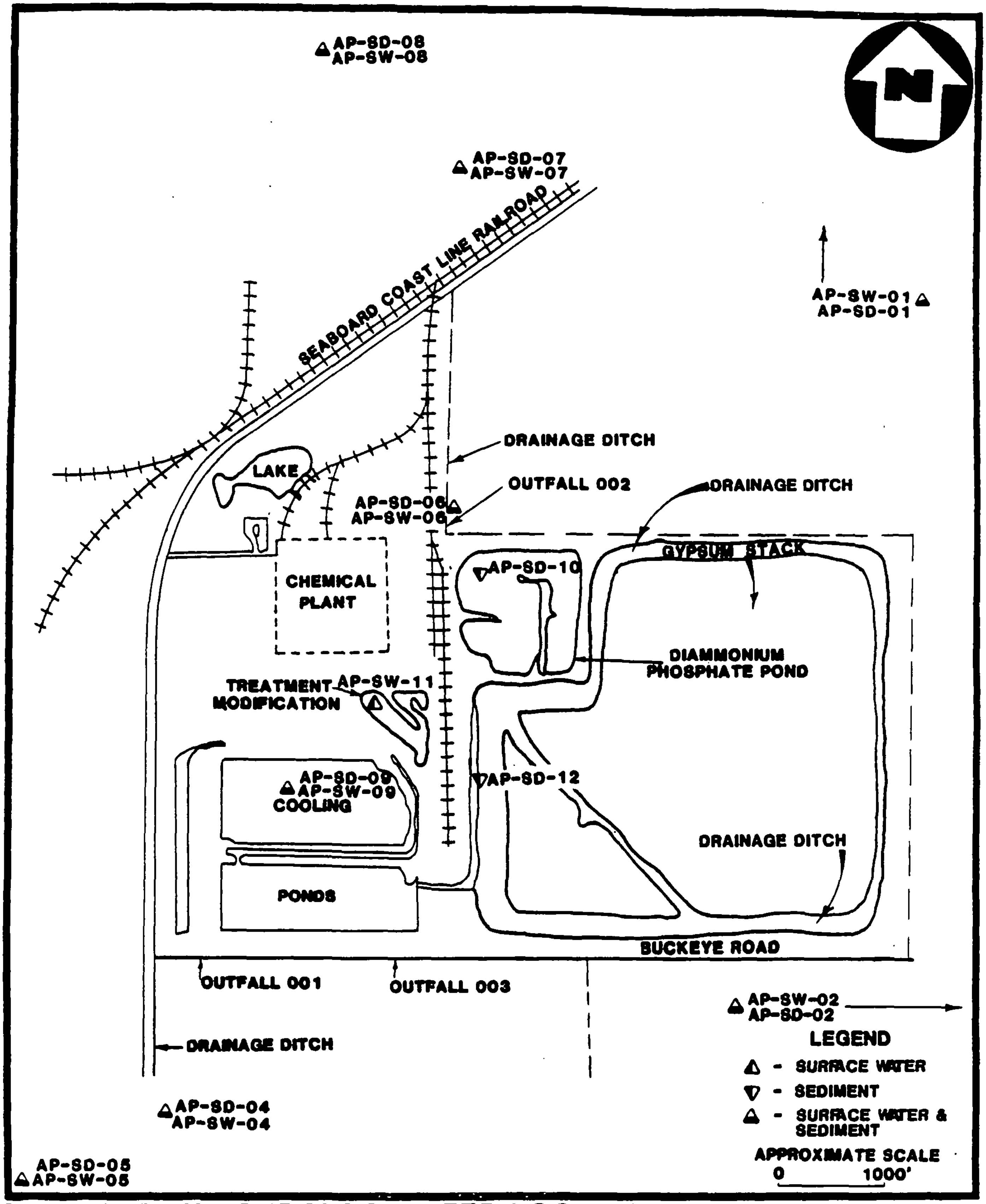
NUS CORPORATION



GROUNDWATER SAMPLE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 4

NUS CORPORATION



SEDIMENT AND SURFACE WATER LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 5

NUS CORPORATION

4.1.4 Field Measurements

Field measurements were performed on all water samples (Table 4). Parameters measured included temperature, pH, and conductivity of the sample at time of collection. No field measurements were performed on the soil samples during this investigation.

4.2 SAMPLE ANALYSIS

4.2.1 Analytical Support and Methodology

All samples collected were analyzed under the Contract Laboratory Program (CLP) and analyzed for all organic parameters listed in the Target Compound List (TCL) and all inorganic parameters in the Target Analyte List (TAL). Organic analysis of soil and water samples was performed by SWOK of Broken Arrow, Oklahoma and Gulf South Environmental Laboratories of New Orleans, Louisiana. Inorganic analysis of soil and water samples was performed by Skinner and Sherman of Waltham, Massachusetts. Additionally, radioactive analysis was performed by National Air and Radiation Environmental Laboratories of Montgomery, Alabama.

All laboratory analyses and laboratory quality assurance procedures used during this investigation were in accordance with standard procedures and protocols as specified in the Laboratory Operations and Quality Control Manual, United States Environmental Protection Agency, Region IV, Environmental Services Division, issued October 24, 1990; or as specified by the existing United States Environmental Protection Agency standard procedures and protocols for the CLP Statement of Work (SOW), as applicable.

4.2.2 Analytical Data Quality and Data Qualifiers

All analytical data were subjected to a quality assurance review as described in the EPA Environmental Services Division laboratory data evaluation guidelines. In the tables, some of the concentrations of the organic and inorganic parameters have been flagged with a "J". This indicates that the qualitative analysis was acceptable, but the quantitative value has been estimated. A few other compounds are flagged with an "N", indicating that they were detected based on the presumptive evidence of their presence. This means that the compound was tentatively identified, and its detection cannot be used as positive identification of its presence. Results for some background samples are reported with a "U" flag. This flag means that the material was analyzed for but not detected. The reported number is the laboratory-derived minimum quantitation limit (MQL) for the compound or element in that sample. At times, miscellaneous organic compounds that do not

TABLE 4

FIELD MEASUREMENTS
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Date (10/90)	Time	pH	Temp. (°C)	Conductivity (umhos/cm)
AP-SW-01	16	1330	7.0	28.3	6510
AP-SW-02*	16	1415	7.2	30.0	1250
AP-SW-04	17	1620	7.0	29.0	2540
AP-SW-05	17	1645	7.1	28.0	13,200
AP-SW-06	17	1440	8.5	30.0	1930
AP-SW-07	17	1515	6.7	30.0	2390
AP-SW-08	17	1605	6.1	28.0	1920
AP-SW-09*	17	1515	2.5	30.0	17,740
AP-SW-11	17	1445	8.9	31.0	5720
AP-TW-01	16	1625	6.7	27.0	707
AP-TW-02	17	1040	6.5	28.0	180
AP-TW-03	17	1145	6.7	28.0	3320
AP-TW-04	18	1040	6.7	27.0	2870
AP-TW-05	18	0930	6.4	26.0	3390
AP-PW-01	17	0935	7.3	24.0	1070
AP-MW-01*	16	1130	6.7	27.0	980
AP-MW-03	16	0900	6.8	26.0	4050
AP-MW-04	16	1520	7.1	27.0	932
AP-MW-05	16	1350	7.3	28.0	1570
AP-MW-06	16	1615	7.4	27.0	745

* AP-SW-03, AP-SW-10, and AP-MW-02 were not collected.

appear on the target compound list are reported with a data set. These compounds are labeled as "JN", indicating that they are tentatively identified at estimated quantities. Because these compounds are not routinely analyzed for or reported, background levels or MQL values are not generally available for comparison. The complete analytical data sheets are presented in Appendix B.

4.2.3 Presentation of Analytical Results

This section presents a discussion and interpretation of the analytical results from the environmental samples collected during the investigation at AMAX Phosphate Facility. Results of surface soil, subsurface soil, sediment, surface water, and groundwater samples are presented in Tables 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14. Background samples have been designated for all media. Values for background sample results are presented as either a measured value or as the MQL. Samples containing concentrations of contaminants greater than 3 times the background level or MQL of these contaminants are considered to be elevated. These samples are noted in the text.

Results from organic analyses indicated that there was minimal contamination from organic compounds. One soil sample (AP-SS-04) contained a small amount of toluene (3 times background, estimated), while carbon disulfide (3 and 26 times MQL) was present in two monitoring wells (AP-MW-04, AP-MW-06), one surficial, and one intermediate. The carbon disulfide could be a by-product from the sulfuric acid manufacturing process. Additionally, elevated amounts of polycyclic aromatic hydrocarbons were detected in the sediment sample (AP-SD-07) collected adjacent to the railroad tracks. These compounds are probably from the chrysene treated wooden tracks. There were no compounds of concern in elevated quantities in surface water samples.

As indicated in Section 2.2.2, the major contaminants of concern at phosphate facilities are inorganics. Since gypsum is an abundant by-product from the phosphate production, a sample (AP-SS-07) was collected to chemically characterize it. Its composition included the following metals: aluminum, barium, calcium, chromium, iron, lead, magnesium, manganese, nickel, sodium, and vanadium. The only one of these present in elevated quantity with appreciable toxicity was barium (3 times background). Since gypsum is basically calcium sulfate, the level of calcium was the highest (30 times background).

Among the metals of concern detected in onsite surface soil samples were barium, cadmium, chromium, manganese, nickel, selenium, and vanadium. The three most contaminated samples (AP-SS-03, AP-SS-05, AP-SS-06) were collected in the area of either waste storage or chemical processing. The following metals were present in elevated quantities: barium (3, 5, and 3 times

TABLE 5

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/kg)	Background		On Site				Gypsum	Background		On Site			
	AP-SS-01	AP-SS-02	AP-SS-03	AP-SS-04	AP-SS-05	AP-SS-06	AP-SS-07	AP-SB-01	AP-SB-02	AP-SB-03	AP-SB-04	AP-SB-05	AP-SB-06
PURGEABLE COMPOUNDS													
TOLUENE	2J	2J	-	6J	1J	1J	-	6U	6U	-	-	-	3J
EXTRACTABLE COMPOUNDS													
PHENOL	890U	720U	-	-	-	-	480J	-	-	-	-	-	-
DI-N-BUTYLPHTHALATE	890U	720U	-	-	120J	-	-	-	-	-	-	-	-
UNIDENTIFIED COMPOUNDS/NO.(1)	8000J/5	3000J/2	8000J/6	3000J/2	5000J/4	2000J/2	1000J/1		800J/1	2000J/2			1000J/1
PETROLEUM PRODUCT(1)		N			N								
DODECANOIC ACID(1)							2000JN						
HEXADECANOIC ACID(1)							4000JN						
PESTICIDE\PCB COMPOUNDS													
4,4'-DDE (P,P'-DDE)	43U	39	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT (P,P'-DDT)	43U	39	-	-	-	-	-	-	-	-	-	-	-
GAMMA-CHLORDANE	220U	45J	-	-	-	-	-	-	-	-	-	-	-
ALPHA-CHLORDANE	220U	52J	-	-	-	-	-	-	-	-	-	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.

TABLE 6

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (mg/kg)	Background		On Site				Gypsum	Background		On Site			
	AP-SS-01	AP-SS-02	AP-SS-03	AP-SS-04	AP-SS-05	AP-SS-06	AP-SS-07	AP-SB-01	AP-SB-02	AP-SB-03	AP-SB-04	AP-SB-05	AP-SB-06
ALUMINUM	1600	200	4600	1300	6000	8300	1100	4500	1100	2900	1100	1700	3100
BARIUM	11	3U	30	13	55	33	30	20	3U	11	5.3	5.6	18
CADMIUM	0.83U	0.63U	2.6	-	4.4	3	-	0.73U	0.69U	-	-	-	-
CALCIUM	45,000	2100	96,000	9200	190,000	88,000	150,000	1900	130U	42,000	600	6700	63,000
CHROMIUM	4.9	6.8	18	-	29	42	11	7.9	1.4U	6.6	-	4.1	5.2
COBALT	1.1U	0.84U	-	-	2.4	1.5	-	-	-	-	-	-	-
IRON	1500J	300J	5200J	2600J	4300J	7000J	1800J	4300J	800J	2700J	460	700J	2500J
LEAD	7.1J	50J	9.5J	-	19J	25J	8.9J	4.3J	1J	1.8J	1.4J	1.3J	3.3J
MAGNESIUM	4500	180	220	260	1100	2700	190	240	30U	280	-	-	390
MANGANESE	24	19	10	-	95	14	25	-	-	-	-	-	-
NICKEL	1.7U	1.3U	5.6	-	9	3.5	3.9	-	-	-	-	-	-
POTASSIUM	160U	30U	420	-	860	820	-	-	-	-	-	-	-
SELENIUM	0.55UR	0.42UR	-	4.9J	-	-	-	-	-	-	-	-	-
SODIUM	280U	30U	1800	-	2600	2900	960	60U	30U	390	-	-	540
VANADIUM	5U	1U	36	-	56	42	13	6U	1U	13	-	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
U Material was analyzed for but not detected. The number given is the MQL.
R Quality Control indicates that data is unusable. Compound may or may not be present.

TABLE 7

SUMMARY OF ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		On Site			Onsite Monitoring Wells					Private Well	Trip Blank
	AP-TW-01	AP-TW-02	AP-TW-03	AP-TW-04	AP-TW-05	AP-MW-01*	AP-MW-03	AP-MW-04	AP-MW-05	AP-MW-06	AP-PW-01	AP-PB-01
PURGEABLE COMPOUNDS												
CARBON DISULFIDE	5U	5U	-	-	-	-	-	14	-	130	-	-
ACETALDEHYDE(1)												6JN
EXTRACTABLE COMPOUNDS												
BENZOIC ACID	50U	42J	-	-	-	-	-	-	-	-	-	-
BIS(2-ETHYLHEXYL) PHTHALATE	10U	10U	-	-	-	-	-	76	-	-	-	-
DIETHYLMETHYLBENZAMIDE(1)						10JN						
BUTYLIDENEBISMETHYLETHYLMETHYLPHENOL(1)							20JN	20JN	10JN			
OCTANOIC ACID(1)							5JN		6JN			
CAPROLACTAM(1)								100JN		70JN		
UNIDENTIFIED COMPOUNDS/NO.(1)								20J/1	100J/3			
DECANOIC ACID(1)									5JN			
BIS(HYDROXYLETHYL)DODECANAMIDE(1)									30JN			
TETRAMETHYLBUTANE(1)					7JN							

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-MW-02 was not collected.

TABLE 8

SUMMARY OF INORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		On Site			Onsite Monitoring Wells					Private Well	Trip Blank
	AP-TW-01	AP-TW-02	AP-TW-03	AP-TW-04	AP-TW-05	AP-MW-01*	AP-MW-03	AP-MW-04	AP-MW-05	AP-MW-06	AP-PW-01	AP-PB-01
ALUMINUM	36,000	260,000	7300	20,000	5600	3400	750	-	1610	-	-	-
ARSENIC	14	53	18	56	-	-	30J	-	-	-	-	-
BARIUM	110	460	53	210	130	-	120	-	52	-	-	-
BERYLLIUM	2U	6	-	-	-	-	-	-	-	-	-	-
CADMIUM	3U	3U	-	-	-	-	18	-	-	-	-	-
CALCIUM	91,000	21,000	600,000	320,000	470,000	81,000	380,000	140,000	270,000	75,000	83,000	-
CHROMIUM	78	190	12	38	13	-	-	-	9	-	-	-
COBALT	7	32	-	9	-	-	-	-	-	-	-	-
IRON	26,000J	170,000J	27,000J	25,000J	2300J	3300J	10,000J	1300J	3200J	-	-	-
LEAD	18	44	-	12	5	5	-	-	-	8	-	-
MAGNESIUM	20,000	9300	36,000	25,000	39,000	37,000	16,000	16,000	61,000	22,000	40,000	-
MANGANESE	70U	70	-	39	-	73	220	-	-	-	-	-
NICKEL	18	89	-	14	-	-	-	-	-	-	-	-
POTASSIUM	29,000	2900	23,000	8000	30,000	4000	9100	2600	9300	6400	3700	-
SODIUM	28,000	2200	7000	120,000	55,000	75,000	350,000	36,000	61,000	29,000	55,000	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
* AP-MW-02 was not collected.

TABLE 8

SUMMARY OF INORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		On Site			Onsite Monitoring Wells					Private Well	Trip Blank
	AP-TW-01	AP-TW-02	AP-TW-03	AP-TW-04	AP-TW-05	AP-MW-01*	AP-MW-03	AP-MW-04	AP-MW-05	AP-MW-06	AP-PW-01	AP-PB-01
VANADIUM	74	170	-	-	130	-	-	-	-	-	-	-
ZINC	60UJ	130J	-	-	-	-	-	-	-	-	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
* AP-MW-02 was not collected.

TABLE 9

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/kg)	Background		Southern Drainage Pathway		Northern Drainage Pathway			On Site			
	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
PURGEABLE COMPOUNDS											
ACETONE	13U	31U	-	-	26	-	-	37	-	-	-
CARBON DISULFIDE	6U	10J	-	-	-	-	-	-	-	-	-
TRIMETHYLBICYCLOHEPTANE(1)						30JN					
METHYL(METHYLETHYL)BENZENE(1)						200JN					
UNIDENTIFIED COMPOUNDS/NO.(1)						20J/1					
EXTRACTABLE COMPOUNDS											
BENZOIC ACID	4100U	10,000U	-	-	-	-	-	-	690J	-	-
ACENAPHTHENE	840U	2100U	-	-	-	140J	-	-	-	-	-
PHENANTHRENE	580J	2100U	-	-	-	760J	-	-	-	-	-
ANTHRACENE	140J	2100U	-	750J	-	190J	-	-	-	-	-
DI-N-BUTYLPHTHALATE	840U	2100U	-	-	-	-	-	-	-	150J	-
FLUORANTHENE	1400	2100U	-	-	-	3200	-	-	-	-	-
PYRENE	750J	2100U	-	-	-	1600	-	-	-	-	-
BENZYL BUTYL PHTHALATE	840U	2100U	-	-	-	-	210J	-	-	-	-
BENZO(A)ANTHRACENE	330J	2100U	-	120J	-	490J	-	-	-	-	-
CHRYSENE	500J	2100U	-	420J	-	710J	-	-	-	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-SD-03 was not collected.

TABLE 9

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/kg)	Background		Southern Drainage Pathway		Northern Drainage Pathway			On Site			
	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
BIS(2-ETHYLHEXYL) PHTHALATE	840U	2100U	-	-	-	-	-	-	-	-	-
BENZO(B AND/OR K)FLUORANTHENE	440J	2100U	-	270J	-	470J	-	-	-	-	-
BENZO(A)PYRENE	380J	2100U	-	210J	-	350J	-	-	-	-	-
INDENO (1,2,3-CD) PYRENE	220J	2100U	-	-	-	140J	-	-	-	-	-
BENZO(GHI)PERYLENE	210J	2100U	-	-	-	-	-	-	-	-	-
UNIDENTIFIED COMPOUNDS/NO.	2000J/2	50,000J/15	2000J/1	3000J/3	-	20,000J/5	20,000J/7	5000J/2	30,000J/4	50,000J/17	3000J/2
PETROLEUM PRODUCT(1)		N				N				N	
DODECANOIC ACID(1)								1000JN	20,000JN		
HEXADECANOIC ACID(1)	600JN	1000JN									1000JN
ANTHRACENEDIONE(1)	300JN										
BENZOFLUORENE(1)	300JN					300JN					
BENZOFLUORANTHENE(NOT B OR K)(1)	200JN										
BENZACEPHENANTHRYLENE(1)	500JN										
TETRAHYDRODIMETHYL(METHYETHYL)NAPHTHALENE(1)						2000JN	500JN				
NAPHTHALENOL(1)						1000JN					
HEPTADECANOIC ACID(1)						500JN		400JN			
OCTADECANOIC ACID(1)								800JN	4000JN		

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-SD-03 was not collected.

TABLE 9

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/kg)	Background		Southern Drainage Pathway		Northern Drainage Pathway			On Site			
	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
PHENYLETHANONE(1)									3000JN		
TETRADECANOIC ACID(1)									700JN		
PHENYLTRICYCLONODIENOL(1)									2000JN		
DIPHENYLPROPANEDIONE(1)									6000JN		
PESTICIDE\PCB COMPOUNDS											
PCB-1248 (AROCLOR 1248)	200U	500U	-	-	-	-	350	-	-	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-SD-03 was not collected.

TABLE 10

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (mg/kg)	Background		Southern Drainage Pathway		Northern Drainage Pathway			On Site			
	AP-SD-01	AP-SD-02*	AP-SD-04	AP-SD-05	AP-SD-06	AP-SD-07	AP-SD-08	AP-SD-09	AP-SD-10	AP-SD-11	AP-SD-12
ALUMINUM	380	10,000	530	1300	1100	1000	950	21,000	4400	300	12,000
BARIUM	2U	80	19	7.5	5.2	13	13	110	72	16	64
CADMIUM	0.71U	1.9U	-	-	-	-	-	2.6	-	-	8
CALCIUM	1400	38,000	2000	3100	8400	27,000	7200	200,000	210,000	220,000	110,000
CHROMIUM	1.4U	20	-	2.8	2.4	6.1	6.6	140	24	7.1	76
COBALT	0.95U	3U	-	-	-	-	-	2.7	-	3.9	3.4
COPPER	9UJ	62J	-	-	-	-	-	-	-	-	-
IRON	440J	11,000J	830J	1600J	9000J	6400J	2100J	45,000J	12,000J	390J	18,000J
LEAD	2.8J	16J	1.1J	74J	1.7J	11J	15J	85J	26J	2.1J	59J
MAGNESIUM	200	2500	82	1100	170	200	520	2000	510	4500	9900
MANGANESE	2U	63	-	-	26	22	-	26	-	44	40
NICKEL	1.4U	6.7	-	-	2.3	2.7	-	-	4.2	17	7.6
POTASSIUM	60U	270U	-	-	-	-	-	2000	550	-	1600
SODIUM	350U	290U	-	2900	-	-	-	12000	3900	2800	6700
VANADIUM	1U	20U	-	-	-	-	-	140	24	-	130

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
* AP-SD-03 was not collected.

TABLE 11

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SURFACE WATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		Northern Drainage Pathway		Southern Drainage Pathway			On Site	
	AP-SW-01	AP-SW-02*	AP-SW-04	AP-SW-05	AP-SW-06	AP-SW-07	AP-SW-08	AP-SW-09*	AP-SW-11
PURGEABLE COMPOUNDS									
CARBON DISULFIDE	5U	5U	-	-	5	-	-	-	4J
TETRAMETHYLBUTANE(1)									8JN
EXTRACTABLE COMPOUNDS									
UNIDENTIFIED COMPOUNDS/NO.(1)					100J/3			60J/4	
BROMACIL(1)			4JN				4JN		
HEXADECANOIC ACID(1)								10JN	10JN
HYDROXYMETHOXY BENZALDEHYDE(1)								5JN	
PETROLEUM PRODUCT(1)								N	
TETRADECANOIC ACID(1)									7JN

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified compound. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.
* AP-SW-03 and AP-SW-10 were not collected.

TABLE 12

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SURFACE WATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		Northern Drainage Pathway		Southern Drainage Pathway			On Site	
	AP-SW-01	AP-SW-02*	AP-SW-04	AP-SW-05	AP-SW-06	AP-SW-07	AP-SW-08	AP-SW-09*	AP-SW-11
ALUMINUM	340U	16,000	-	-	-	-	-	27,000	-
ARSENIC	5U	8U	-	-	-	-	-	-	49
BARIUM	20U	120	-	29	-	-	-	63	-
BERYLLIUM	1U	1U	-	-	-	-	-	23	-
CADMIUM	3U	3U	-	-	-	-	-	130	-
CALCIUM	61,000	170,000	160,000	160,000	150,000	180,000	160,000	670,000	170,000
CHROMIUM	6U	28	-	-	-	-	-	360	-
COBALT	4U	4U	-	-	-	-	-	210	-
IRON	350UJ	14,000J	-	-	-	-	-	29,000J	-
LEAD	5	14	-	-	-	-	-	35	-
MAGNESIUM	140,000	46,000	58,000	220,000	66,000	59,000	42,000	200,000	49,000
MANGANESE	20U	110	-	-	-	-	52	4100	-
NICKEL	6U	8U	-	-	-	-	-	690	-
POTASSIUM	47,000	13,000	16,000	68,000	3700	5300	6800	160,000	89,000
SODIUM	1,100,000	68,000	110,000	1,500,000	42,000	100,000	69,000	1,200,000	650,000
THALLIUM	10UR	10UR	-	-	-	-	-	13J	-
VANADIUM	4U	30U	-	-	-	-	-	820	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
R Quality Control indicates that data is unusable. Compound may or may not be present.
* AP-SW-03 and AP-SW-10 were not collected.

TABLE 12

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SURFACE WATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

PARAMETERS (ug/l)	Background		Northern Drainage Pathway		Southern Drainage Pathway			On Site	
	AP-SW-01	AP-SW-02*	AP-SW-04	AP-SW-05	AP-SW-06	AP-SW-07	AP-SW-08	AP-SW-09*	AP-SW-11
ZINC	40UJ	130UJ	-	-	-	-	-	1400J	-
CYANIDE	10U	10U	-	-	-	14	100	-	-

- \- Material analyzed for but not detected above minimum quantitation limit (MQL).
- J Estimated value.
- N Presumptive evidence of presence of material.
- U Material was analyzed for but not detected. The number given is the MQL.
- R Quality Control indicates that data is unusable. Compound may or may not be present.
- * AP-SW-03 and AP-SW-10 were not collected.

TABLE 13

SUMMARY OF RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Parameters (pCi/g)(1)	Background AP-SS-01	On Site AP-SS-06	Gypsum AP-SS-07	Background AP-SD-01	Northern AP-SD-06	Southern AP-SD-12
Radium-226	0.89 ± 5.00%	8.12 ± 1.00%	16.5 ± 1.0%	0.36 ± 7.00%	0.76 ± 5.00%	7.36 ± 1.00%
Radium-228	0.56 ± 153%	0.49 ± 186%	8.10 ± 17.0%	0.85 ± 115%	0.38 ± 256%	0.73 ± 128%

(1) Results are for dry soil.

TABLE 14

SUMMARY OF RADIONUCLIDE CONCENTRATIONS IN WATER SAMPLES
AMAX PHOSPHATE FACILITY
PALMETTO, MANATEE COUNTY, FLORIDA

Parameters (pCi/l)	Background	Monitoring Wells		Background	Southern Drainage
	AP-TW-01	AP-MW-03	AP-MW-06	AP-SW-01	AP-SD-12
Radium-226	7.32 ± 2.00%	16.4 ± 1.00%	1.13 ± 3.00%	0.54 ± 4.00%	1.85 ± 2.00%
Radium-228	2.43 ± 87.5%	1.76 ± 64.6%	0.53 ± 81.0%	0.53 ± 85.8%	0.29 ± 182%
Gross Alpha	53.8 ± 21.6%	44.6 ± 42.4%	1.75 ± 169%	5.04 ± 235%	5.30 ± 83.3%

background); cadmium (3, 5, and 3 times MQL); chromium (3, 5, and 6 times background); and vanadium (7, 10, and 8 times MQL) were detected in all three samples. Nickel (3 and 5 times MQL) was found in two soil samples (AP-SS-03 and AP-SS-05), while manganese (4 times background) was detected in one (4 times background). The only contaminant of concern present in elevated quantities in the fourth onsite sample (AP-SS-04) was selenium (10 times MQL, estimated). There were no inorganics of concern found in elevated quantities in subsurface soil samples.

The only metals of concern detected in elevated quantities in groundwater were cadmium (6 times MQL) and manganese (3 times MQL) from AP-MW-03. This monitoring well is located in the center of the facility between the chemical plant and gypsum stacks. The EPA maximum contaminant level (MCL) for primary drinking water standards for manganese (50 ug/l) was exceeded in this sample (Ref. 26). Although arsenic was detected in levels less than 3 times background, its concentration (56 ug/l) in the sample from AP-TW-04, collected east of the chemical plant, exceeded the MCL (50 ug/l). With samples ranging in concentration from 1,300 to 27,000 ug/l, the secondary MCL (300 ug/l) for iron was also exceeded in seven of the onsite groundwater samples.

The only sediment samples with large quantities of inorganics of concern were collected from the cooling pond (AP-SD-09) and drainage ditch adjacent to the gypsum stacks (AP-SD-12). Both had chromium (7 and 3 times MQL), lead (5 and 4 times background estimated), and vanadium (7 and 6 times MQL). As with the sediment samples, onsite surface water samples were the only ones with elevated quantities of contamination. The surface water sample from the cooling pond contained cadmium (6 times MQL), chromium (13 times MQL), lead (3 times background), manganese (37 times background), nickel (86 times background), and vanadium (27 times MQL). Cyanide (10 times MQL) was also found in one offsite sample collected on the northern drainage pathway, but it is not site related. Since there were no inorganics of concern detected in elevated amounts in either offsite sediment or surface water samples, it can be assumed that these contaminants are not migrating from the facility along the surface water migration pathway.

Radium-226, radium-228, and gross alpha analyses were performed on select soil, sediment, groundwater, and surface water samples. The radium-226 and radium-228 analyses for the sample (AP-SS-07) were 18.5 and 14.5 times background respectively; while the onsite soil sample was 9.1 times background for radium-226, but not elevated for radium-228. The sediment sample collected from the northern drainage ditch (AP-SD-06) was slightly elevated (2 times background) for radium-226 and beneath background values for radium-228. Radium-226 was more elevated (10 times background) in the sediment collected in the southern drainage ditch (AP-SD-12). Although there are no specific criteria for radium deposition, the National Council on Radiation Protection and Measurements (NCRP) has recommended a guide of 40 picocuries of radium-226 per gram of soil as a concentration to be evaluated for agricultural land use (Ref. 27). All of these values are beneath that quantity.

The gross alpha particle activity for two groundwater samples (AP-TW-01, AP-MW-03) was above the maximum contaminant level (MCL) for primary drinking water standards (15 pCi/l). The sample collected from a surficial aquifer monitoring well (AP-MW-03) was 44.6 pCi/l. This value was slightly lower than the background (53.8 pCi/l) which was above the MCL. The amount of radium-226 in this monitoring well sample (AP-MW-03) was also slightly elevated (2.2 times background). Both groundwater samples (AP-TW-01, AP-MW-03) exceeded the combined radium-226, radium-228 MCL (5 pCi/l) for primary drinking water standards with combined values of 9.75 and 18.2 pCi/l, respectively. Radionuclide analyses were not elevated in the third groundwater sample. The only elevated quantity in surface water was for radium-226 (3.4 times background) in the sample collected from the southern drainage pathway (AP-SW-06).

5.0 SUMMARY

All three contaminant pathways, surface water, groundwater, contact, and air, are of concern for AMAX Phosphate. Surface water run-off from the facility is channeled by way of two drainage ditches into either Bishop Harbor then Tampa Bay, or Piney Point Creek and then Tampa Bay. Fishing, boating, and bathing occur along the surface water migration pathway. Additionally, the area is surrounded by wetlands which drain toward the north into the Little Manatee River. This river is a critical habitat for the Florida manatee (Trichechus manatus), which is often sighted in the river. There are also other federally and state-protected or endangered species with ranges in the area. Furthermore, the facility is located in a flood plain, making migration of contaminants more likely during wet weather.

Since many people within the 4-mile radius obtain potable water from shallow wells, groundwater contamination may pose a serious potential threat. Water for irrigation is also obtained from wells in Manatee County. Additionally, the area is characterized by karst terrain containing sinkholes and underground cavities.

Gases from the site make airborne contamination a potential threat. Emission of phosphorous and sulfur oxides from the stacks pose a potential problem with air contamination. Because of the acidity of the process waters, the small amount of fluorides in the gypsum are converted to hydrogen fluoride. In fact, fluorides that probably originate from hydrogen fluoride are often found during the analysis of grass and foliage. Airborne contamination was evident from the stressed vegetation surrounding the plant. This could affect the residents and cattle in the area also.

Since the gypsum stacks are in the open, and process water is evident throughout the facility, contamination from contact could pose a potential threat to onsite employees. As the facility is not fenced along the southern border, access can be attained by foot.

During this sampling investigation, 44 environmental samples were collected. These include soil, groundwater, sediment, and surface water samples. The only organic pollutants of concern detected in elevated quantities in soil were toluene and carbon disulfide. Carbon disulfide, a by-product in the sulfuric acid manufacturing process, was also found in one groundwater sample collected from an onsite monitoring well. There were no organic compounds of concern that are associated with the processes at the plant found in either sediment or surface water samples.

In order to characterize the inorganic constituents in gypsum, a sample of newly deposited material was analyzed. It contained the following metals: aluminum, barium, calcium, chromium, iron, lead, magnesium, manganese, nickel, sodium, and vanadium. Those inorganics of concern detected in elevated quantities in soil samples, and also found in the gypsum, were barium, cadmium, chromium, manganese, nickel, selenium, and vanadium. Only cadmium and manganese were detected in elevated quantities in one onsite groundwater sample. The primary EPA maximum contaminant level (MCL) for drinking water standards was exceeded for manganese in this sample. Although the quantity of arsenic was not elevated, the MCL was exceeded in one groundwater sample collected on site. Additionally the secondary MCL in drinking water for iron (300 ug/l) was exceeded in seven of the onsite groundwater samples.

Chromium, lead, and vanadium were detected in elevated quantities in a sediment sample collected on site from the drainage ditch, while the only surface water sample containing elevated amounts of inorganics, including cadmium, chromium, lead, manganese, nickel, and vanadium, was taken from the cooling pond. There was no evidence of migration of these contaminants along the surface water pathway from this study.

Analysis for radioactive nuclides in soil samples revealed that the onsite soil sample contained an elevated amount of radium-226 but not radium-228. Also, the amount of this nuclide in the southern drainage pathway was more elevated than in the northern drainage pathway (10 times versus 2 times background). Values of radium-226 and radium-228 were 18.5 and 14.5 times background, respectively, for the gypsum sample. However, none of these values exceeded the National Council on Radiation Protection and Measurements maximum criteria for radium-226 deposition on agricultural land (40 pCi/g). For groundwater samples, the MCL for primary drinking water standards was exceeded for gross alpha particle activity (915 pCi/l) for the background and one onsite surficial aquifer monitoring well sample. Additionally, the combined radium-226, radium-228 MCL (5 pCi/l) was also exceeded for these two samples. This value for radium-226 was exceeded for the surface water sample collected in the southern drainage pathway too; however, this is not a potable source. Unlike the organic and inorganic results, the elevated radium-226 values for the surface water and sediment samples collected in the southern drainage pathway indicate migration of this nuclide from AMAX along the surface water pathway.

Because of the targets associated with the four contaminant pathways and the elevated quantities of contaminants found at AMAX Phosphate, FIT 4 recommends that this site be evaluated using the HRS (effective March 14, 1991).

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U.S. EPA REGION IV

SDMS

Unscannable Material Target Sheet

DocID: 10079026 Site ID: FID043055515

Site Name: Hew Site

Nature of Material:

Map: 1

Photos:

Blueprints:

Slides:

Computer Disks:

CD-ROM:

Oversized Report:

Log Book:

Other (describe):

Amount of material: (1) Appendix A

Please contact the appropriate Records Center to view the material.

APPENDIX B

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51680 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-01 COLLECTION START: 10/16/90 1520 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y138

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1600	ALUMINUM	24	MANGANESE
6.6U	ANTIMONY	0.12U	MERCURY
2UJ	ARSENIC	1.7U	NICKEL
11	BARIUM	160U	POTASSIUM
0.28U	BERYLLIUM	0.55UR	SELENIUM
0.83U	CADMIUM	1.40J	SILVER
45000	CALCIUM	280U	SODIUM
4.9	CHROMIUM	0.55U	THALLIUM
1.1U	COBALT	NA	TIN
8UJ	COPPER	5U	VANADIUM
1500J	IRON	30UJ	ZINC
7.1J	LEAD	30	PERCENT MOISTURE
4500	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

PROG ELEM: NSF COLLECTED BY: M GORDON **

** SOURCE: AMAX PHOSPHATE FACIL CITY [redacted] **

[redacted] ([redacted]) SS[redacted] COLLECTION START: [redacted] 0925 STOP: [redacted] **

** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y144 **

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
200	ALUMINUM	19	MANGANESE
5.1U	ANTIMONY	0.10U	MERCURY
1UJ	ARSENIC	1.3U	NICKEL
3U	BARIUM	30U	POTASSIUM
0.21U	BERYLLIUM	0.42UR	SELENIUM
0.63U	CADMIUM	1.1UJ	SILVER
2100	CALCIUM	30U	SODIUM
6.8	CHROMIUM	0.42U	THALLIUM
0.84U	COBALT	NA	TIN
20UJ	COPPER	1U	VANADIUM
300J	IRON	20UJ	ZINC
50J	LEAD	07	PERCENT MOISTURE
180	MAGNESIUM		

FOOTNOTES

*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL

*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN

*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51689 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SS-03
COLLECTION START: 10/17/90 1020 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
MD NUMBER: Y148

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
4600	ALUMINUM	10	MANGANESE
5.7U	ANTIMONY	0.12U	MERCURY
2UJ	ARSENIC	5.6	NICKEL
30	BARIUM	420	POTASSIUM
1U	BERYLLIUM	2.4UR	SELENIUM
2.6	CADMIUM	1.2UJ	SILVER
96000	CALCIUM	1800	SODIUM
18	CHROMIUM	0.48U	THALLIUM
2U	COBALT	NA	TIN
4UJ	COPPER	36	VANADIUM
5200J	IRON	20UJ	ZINC
9.5J	LEAD	19	PERCENT MOISTURE
220	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   12/04/90

METALS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51663   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SS-04   COLLECTION START: 10/18/90 1020   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: MD NUMBER: Y173

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1300	ALUMINUM	4U	MANGANESE
7.7U	ANTIMONY	0.12U	MERCURY
2UJ	ARSENIC	1.5U	NICKEL
13	BARIUM	40U	POTASSIUM
0.26U	BERYLLIUM	4.9J	SELENIUM
0.77U	CADMIUM	1.3UJ	SILVER
9200	CALCIUM	190U	SODIUM
3U	CHROMIUM	0.50U	THALLIUM
1.8U	COBALT	NA	TIN
5UJ	COPPER	4U	VANADIUM
2600J	IRON	4UJ	ZINC
8.9U	LEAD	23	PERCENT MOISTURE
260	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-05
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 0900 STOP: 00/00/00
MD NUMBER: Y170

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
6000	ALUMINUM	95	MANGANESE
6.5U	ANTIMONY	0.11U	MERCURY
2.3UR	ARSENIC	9	NICKEL
55	BARIUM	860	POTASSIUM
1U	BERYLLIUM	3.4UR	SELENIUM
4.4	CADMIUM	1.1UJ	SILVER
190000	CALCIUM	2600	SODIUM
29	CHROMIUM	1U	THALLIUM
2.4	COBALT	NA	TIN
5UJ	COPPER	56	VANADIUM
4300J	IRON	50UJ	ZINC
19J	LEAD	14	PERCENT MOISTURE
1100	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SS-06
COLLECTION START: 10/17/90 1205 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
MD NUMBER: Y152

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
8300	ALUMINUM	14	MANGANESE
5.7U	ANTIMONY	0.10U	MERCURY
1.2UR	ARSENIC	3.5	NICKEL
33	BARIUM	820	POTASSIUM
1U	BERYLLIUM	2.4UR	SELENIUM
3	CADMIUM	1.2UJ	SILVER
88000	CALCIUM	2900	SODIUM
42	CHROMIUM	0.48U	THALLIUM
1.5	COBALT	NA	TIN
7UJ	COPPER	42	VANADIUM
7000J	IRON	20UJ	ZINC
25J	LEAD	21	PERCENT MOISTURE
2700	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51667   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SS-07   COLLECTION START: 10/17/90 1150   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: MD NUMBER: Y153

MG/KG	ANALYTICAL RESULTS
1100	ALUMINUM
5.4U	ANTIMONY
3UJ	ARSENIC
30	BARIUM
1U	BERYLLIUM
1U	CADMIUM
150000	CALCIUM
11	CHROMIUM
2U	COBALT
2UJ	COPPER
1800J	IRON
8.9J	LEAD
190	MAGNESIUM

MG/KG	ANALYTICAL RESULTS
25	MANGANESE
0.10U	MERCURY
3.9	NICKEL
240U	POTASSIUM
2.3UR	SELENIUM
1.1UJ	SILVER
960	SODIUM
0.45U	THALLIUM
NA	TIN
13	VANADIUM
20UJ	ZINC
16	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51681 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-01 COLLECTION START: 10/16/90 1535 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y139

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
4500	ALUMINUM	3U	MANGANESE
5.9U	ANTIMONY	0.11U	MERCURY
2UJ	ARSENIC	2U	NICKEL
20	BARIUM	160U	POTASSIUM
1U	BERYLLIUM	0.47UR	SELENIUM
0.73U	CADMIUM	1.2UJ	SILVER
1900	CALCIUM	60U	SODIUM
7.9	CHROMIUM	0.47U	THALLIUM
0.98U	COBALT	NA	TIN
0.73UJ	COPPER	6U	VANADIUM
4300J	IRON	4UJ	ZINC
4.3J	LEAD	21	PERCENT MOISTURE
240	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51686 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-02 COLLECTION START: 10/17/90 0945 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y145

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1100	ALUMINUM	1U	MANGANESE
5.5U	ANTIMONY	0.11U	MERCURY
1UJ	ARSENIC	1.4U	NICKEL
3U	BARIUM	30U	POTASSIUM
0.23U	BERYLLIUM	0.47UR	SELENIUM
0.69U	CADMIUM	1.2UJ	SILVER
130U	CALCIUM	30U	SODIUM
1.4U	CHROMIUM	0.47U	THALLIUM
0.92U	COBALT	NA	TIN
0.69UJ	COPPER	1U	VANADIUM
800J	IRON	4UJ	ZINC
1J	LEAD	19	PERCENT MOISTURE
30U	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51671 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-03 COLLECTION START: 10/17/90 1135 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y149

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
2900	ALUMINUM	5U	MANGANESE
5.6U	ANTIMONY	0.12U	MERCURY
1UJ	ARSENIC	1.4U	NICKEL
11	BARIUM	90U	POTASSIUM
0.24U	BERYLLIUM	0.50UR	SELENIUM
0.71U	CADMIUM	1.2UJ	SILVER
42000	CALCIUM	390	SODIUM
6.6	CHROMIUM	0.50U	THALLIUM
0.94U	COBALT	NA	TIN
0.71UJ	COPPER	13	VANADIUM
2700J	IRON	4UJ	ZINC
1.8J	LEAD	22	PERCENT MOISTURE
280	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51661 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-04
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 1030 STOP: 00/00/00
MD NUMBER: Y174

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1100	ALUMINUM	3U	MANGANESE
7.4U	ANTIMONY	0.11U	MERCURY
2UJ	ARSENIC	1.5U	NICKEL
5.3	BARIUM	33U	POTASSIUM
0.25U	BERYLLIUM	0.73UR	SELENIUM
0.74U	CADMIUM	1.2UJ	SILVER
600	CALCIUM	60U	SODIUM
2U	CHROMIUM	0.49U	THALLIUM
1.7U	COBALT	NA	TIN
3UJ	COPPER	2U	VANADIUM
460	IRON	4UJ	ZINC
1.4J	LEAD	20	PERCENT MOISTURE
60U	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51665 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-05
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 0910 STOP: 00/00/00
MD NUMBER: Y171

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1700	ALUMINUM	5U	MANGANESE
7.2U	ANTIMONY	0.10U	MERCURY
2UJ	ARSENIC	1.4U	NICKEL
5.6	BARIUM	70U	POTASSIUM
0.24U	BERYLLIUM	0.71UR	SELENIUM
0.72U	CADMIUM	1.2UJ	SILVER
6700	CALCIUM	160U	SODIUM
4.1	CHROMIUM	0.47U	THALLIUM
1.7U	COBALT	NA	TIN
6UJ	COPPER	9U	VANADIUM
700J	IRON	5UJ	ZINC
1.3J	LEAD	18	PERCENT MOISTURE
190U	MAGNESIUM		

FOOTNOTES
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*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-06
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1215 STOP: 00/00/00
MD NUMBER: Y155

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
3100	ALUMINUM	7U	MANGANESE
5.3U	ANTIMONY	0.12U	MERCURY
1UJ	ARSENIC	2U	NICKEL
18	BARIUM	180U	POTASSIUM
0.22U	BERYLLIUM	0.47UR	SELENIUM
1U	CADMIUM	1.1UJ	SILVER
63000	CALCIUM	540	SODIUM
5.2	CHROMIUM	0.47U	THALLIUM
0.88U	COBALT	NA	TIN
2UJ	COPPER	6U	VANADIUM
2500J	IRON	5UJ	ZINC
3.3J	LEAD	16	PERCENT MOISTURE
390	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-01 COLLECTION START: 10/16/90 1335 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y136

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
380	ALUMINUM	2U	MANGANESE
5.7U	ANTIMONY	0.11U	MERCURY
2UJ	ARSENIC	1.4U	NICKEL
2U	BARIUM	60U	POTASSIUM
0.24U	BERYLLIUM	0.48UR	SELENIUM
0.71U	CADMIUM	1.2UJ	SILVER
1400	CALCIUM	350U	SODIUM
1.4U	CHROMIUM	0.48U	THALLIUM
0.95U	COBALT	NA	TIN
9UJ	COPPER	1U	VANADIUM
440J	IRON	9UJ	ZINC
2.8J	LEAD	22	PERCENT MOISTURE
200	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51678 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-02
COLLECTION START: 10/16/90 1420 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
MD NUMBER: Y140

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
10000	ALUMINUM	63	MANGANESE
20U	ANTIMONY	0.26U	MERCURY
5UJ	ARSENIC	6.7	NICKEL
80	BARIUM	270U	POTASSIUM
0.63U	BERYLLIUM	1.2UR	SELENIUM
1.9U	CADMIUM	3.2UJ	SILVER
38000	CALCIUM	290U	SODIUM
20	CHROMIUM	1.2U	THALLIUM
3U	COBALT	NA	TIN
[redacted]	[redacted]	20U	VANADIUM
11000J	IRON	70UJ	ZINC
16J	LEAD	69	PERCENT MOISTURE
2500	MAGNESIUM		

FOOTNOTES
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*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51645 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-04
COLLECTION START: 10/17/90 1630 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
MD NUMBER: Y166

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
530	ALUMINUM	5U	MANGANESE
5.6U	ANTIMONY	0.10U	MERCURY
1UJ	ARSENIC	1.4U	NICKEL
19	BARIUM	30U	POTASSIUM
0.23U	BERYLLIUM	0.49UR	SELENIUM
0.70U	CADMIUM	1.2UJ	SILVER
2000	CALCIUM	60U	SODIUM
1.4U	CHROMIUM	0.49U	THALLIUM
0.93U	COBALT	NA	TIN
3UJ	COPPER	1U	VANADIUM
830J	IRON	9UJ	ZINC
1.1J	LEAD	20	PERCENT MOISTURE
82	MAGNESIUM		

FOOTNOTES
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*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

METALS DATA REPORT 12/04/90

PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-05
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 1655 STOP: 00/00/00
MD NUMBER: Y168

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1300	ALUMINUM	20U	MANGANESE
6.9U	ANTIMONY	0.14U	MERCURY
2UJ	ARSENIC	1.7U	NICKEL
7.5	BARIUM	280U	POTASSIUM
0.29U	BERYLLIUM	0.57UR	SELENIUM
0.86U	CADMIUM	1.4UJ	SILVER
3100	CALCIUM	2900	SODIUM
2.8	CHROMIUM	0.57U	THALLIUM
1.1U	COBALT	NA	TIN
20UJ	COPPER	3U	VANADIUM
1600J	IRON	20UJ	ZINC
74J	LEAD	31	PERCENT MOISTURE
1100	MAGNESIUM		

FOOTNOTES
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*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51655 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-06 COLLECTION START: 10/17/90 1445 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y156

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1100	ALUMINUM	26	MANGANESE
6U	ANTIMONY	0.11U	MERCURY
1UJ	ARSENIC	2.3	NICKEL
5.2	BARIUM	40U	POTASSIUM
0.25U	BERYLLIUM	0.48UR	SELENIUM
0.75U	CADMIUM	1.2UJ	SILVER
8400	CALCIUM	140U	SODIUM
2.4	CHROMIUM	0.48U	THALLIUM
1U	COBALT	NA	TIN
4UJ	COPPER	3U	VANADIUM
9000J	IRON	9UJ	ZINC
1.7J	LEAD	21	PERCENT MOISTURE
170	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-07 COLLECTION START: 10/17/90 1520 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y160

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1000	ALUMINUM	22	MANGANESE
6.2U	ANTIMONY	0.12U	MERCURY
2UJ	ARSENIC	2.7	NICKEL
13	BARIUM	50U	POTASSIUM
0.26U	BERYLLIUM	0.52UR	SELENIUM
0.78U	CADMIUM	1.3UJ	SILVER
27000	CALCIUM	140U	SODIUM
6.1	CHROMIUM	0.52U	THALLIUM
1U	COBALT	NA	TIN
8UJ	COPPER	5U	VANADIUM
6400J	IRON	30UJ	ZINC
11J	LEAD	26	PERCENT MOISTURE
200	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51648 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-08 COLLECTION START: 10/17/90 1610 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y164

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
950	ALUMINUM	20U	MANGANESE
7U	ANTIMONY	0.14U	MERCURY
2UJ	ARSENIC	2U	NICKEL
13	BARIUM	50U	POTASSIUM
0.29U	BERYLLIUM	0.59UR	SELENIUM
0.87U	CADMIUM	1.4UJ	SILVER
7200	CALCIUM	160U	SODIUM
6.6	CHROMIUM	0.59U	THALLIUM
1.2U	COBALT	NA	TIN
20UJ	COPPER	4U	VANADIUM
2100J	IRON	40UJ	ZINC
15J	LEAD	33	PERCENT MOISTURE
520	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-09 COLLECTION START: 10/17/90 1530 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y162

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
21000	ALUMINUM	26	MANGANESE
20U	ANTIMONY	0.17U	MERCURY
2.1UR	ARSENIC	4U	NICKEL
110	BARIUM	2000	POTASSIUM
2U	BERYLLIUM	0.86UR	SELENIUM
2.6	CADMIUM	2.1UJ	SILVER
200000	CALCIUM	12000	SODIUM
140	CHROMIUM	4UJ	THALLIUM
2.7	COBALT	NA	TIN
10UJ	COPPER	140	VANADIUM
45000J	IRON	70UJ	ZINC
85J	LEAD	54	PERCENT MOISTURE
2000	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

** PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-10 COLLECTION START: 10/17/90 1045 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y150 . **

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
4400	ALUMINUM	9U	MANGANESE
8.6U	ANTIMONY	0.19U	MERCURY
0.37UR	ARSENIC	4.2	NICKEL
72	BARIUM	550	POTASSIUM
0.36U	BERYLLIUM	3.7UR	SELENIUM
2U	CADMIUM	1.8UJ	SILVER
210000	CALCIUM	3900	SODIUM
24	CHROMIUM	0.74U	THALLIUM
2U	COBALT	NA	TIN
3UJ	COPPER	24	VANADIUM
12000J	IRON	20UJ	ZINC
26J	LEAD	46	PERCENT MOISTURE
510	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-11 COLLECTION START: 10/17/90 1505 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y159

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
300	ALUMINUM	44	MANGANESE
9.2U	ANTIMONY	0.18U	MERCURY
4UJ	ARSENIC	17	NICKEL
16	BARIUM	290U	POTASSIUM
0.38U	BERYLLIUM	0.82UR	SELENIUM
2U	CADMIUM	1.9UJ	SILVER
220000	CALCIUM	2800	SODIUM
7.1	CHROMIUM	0.82U	THALLIUM
3.9	COBALT	NA	TIN
2UJ	COPPER	5U	VANADIUM
390J	IRON	20UJ	ZINC
2.1J	LEAD	51	PERCENT MOISTURE
4500	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-12
COLLECTION START: 10/17/90 1230 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
MD NUMBER: Y154

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
12000	ALUMINUM	40	MANGANESE
6.9U	ANTIMONY	0.14U	MERCURY
1.5UR	ARSENIC	7.6	NICKEL
64	BARIUM	1600	POTASSIUM
2U	BERYLLIUM	3.1UR	SELENIUM
8	CADMIUM	1.4UJ	SILVER
110000	CALCIUM	6700	SODIUM
76	CHROMIUM	0.61U	THALLIUM
3.4	COBALT	NA	TIN
8UJ	COPPER	130	VANADIUM
18000J	IRON	70UJ	ZINC
59J	LEAD	36	PERCENT MOISTURE
9900	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51683 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-01 COLLECTION START: 10/16/90 1625 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y142

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
36000	ALUMINUM	70U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
14	ARSENIC	18	NICKEL
110	BARIUM	29000	POTASSIUM
2U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
91000	CALCIUM	28000	SODIUM
78	CHROMIUM	10UR	THALLIUM
7	COBALT	NA	TIN
20U	COPPER	74	VANADIUM
26000J	IRON	60UJ	ZINC
18	LEAD		
20000	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51690 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-02 COLLECTION START: 10/17/90 1040 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y146

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
260000	ALUMINUM	70	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
53	ARSENIC	89	NICKEL
460	BARIUM	2900	POTASSIUM
6	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
21000	CALCIUM	2200	SODIUM
190	CHROMIUM	2UR	THALLIUM
32	COBALT		TIN
20U	COPPER	170	VANADIUM
170000J	IRON	130J	ZINC
44	LEAD		
9300	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

** PROJECT NO. 91-025 SAMPLE NO. 51672 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: TW-03 COLLECTION START: 10/17/90 1145 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y151 **

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
7300	ALUMINUM	30U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
18	ARSENIC	6U	NICKEL
53	BARIUM	23000	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
600000	CALCIUM	7000	SODIUM
12	CHROMIUM	2UR	THALLIUM
4U	COBALT	NA	TIN
4U	COPPER	20U	VANADIUM
27000J	IRON	50UJ	ZINC
3U	LEAD		
36000	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51662   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: TW-04   COLLECTION START: 10/18/90 1040   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: MD NUMBER: Y175

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
20000	ALUMINUM	39	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
56	ARSENIC	14	NICKEL
210	BARIUM	8000	POTASSIUM
2U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
320000	CALCIUM	120000	SODIUM
38	CHROMIUM	10UR	THALLIUM
9	COBALT	NA	TIN
3U	COPPER	50U	VANADIUM
25000J	IRON	80UJ	ZINC
12	LEAD		
25000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51664 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-05 COLLECTION START: 10/18/90 0930 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y172

UG/L	ANALYTICAL RESULTS
5600	ALUMINUM
24U	ANTIMONY
3U	ARSENIC
130	BARIUM
1U	BERYLLIUM
3U	CADMIUM
470000	CALCIUM
13	CHROMIUM
4U	COBALT
6U	COPPER
2300J	IRON
5	LEAD
39000	MAGNESIUM

UG/L	ANALYTICAL RESULTS
10U	MANGANESE
0.20U	MERCURY
6U	NICKEL
30000	POTASSIUM
10UJ	SELENIUM
5UJ	SILVER
55000	SODIUM
10UR	THALLIUM
NA	TIN
130	VANADIUM
60UJ	ZINC

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51673 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-01 COLLECTION START: 10/16/90 1130 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y326

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
3400	ALUMINUM	73	MANGANESE
30U	ANTIMONY	0.20U	MERCURY
6U	ARSENIC	8U	NICKEL
30U	BARIUM	4000	POTASSIUM
1U	BERYLLIUM	3U	SELENIUM
3U	CADMIUM	5UJ	SILVER
81000	CALCIUM	75000	SODIUM
5U	CHROMIUM	10UR	THALLIUM
7U	COBALT	NA	TIN
7U	COPPER	9U	VANADIUM
3300J	IRON	50UJ	ZINC
5	LEAD		
37000	MAGNESIUM		

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-03 COLLECTION START: 10/17/90 0900 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y328

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
750	ALUMINUM	220	MANGANESE
30U	ANTIMONY	0.20U	MERCURY
30J	ARSENIC	6U	NICKEL
120	BARIUM	9100	POTASSIUM
1U	BERYLLIUM	15UJ	SELENIUM
18	CADMIUM	5UJ	SILVER
380000	CALCIUM	350000	SODIUM
5U	CHROMIUM	10UR	THALLIUM
7U	COBALT	NA	TIN
3U	COPPER	8U	VANADIUM
10000J	IRON	240UJ	ZINC
4U	LEAD		
16000	MAGNESIUM		

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51679   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: MW-04   COLLECTION START: 10/16/90 1520   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: MD NUMBER: Y327

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
440U	ALUMINUM	8U	MANGANESE
30U	ANTIMONY	0.20U	MERCURY
3UJ	ARSENIC	6U	NICKEL
30U	BARIUM	2600	POTASSIUM
1U	BERYLLIUM	3UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
140000	CALCIUM	36000	SODIUM
5U	CHROMIUM	2UR	THALLIUM
7U	COBALT	NA	TIN
5U	COPPER	4U	VANADIUM
1300J	IRON	50UJ	ZINC
3U	LEAD		
16000	MAGNESIUM		

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y329

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
1610	ALUMINUM	50U	MANGANESE
30U	ANTIMONY	0.20U	MERCURY
6UJ	ARSENIC	6U	NICKEL
52	BARIUM	9300	POTASSIUM
1U	BERYLLIUM	3UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
270000	CALCIUM	61000	SODIUM
9	CHROMIUM	10UR	THALLIUM
7U	COBALT	NA	TIN
3U	COPPER	20U	VANADIUM
3200J	IRON	50UJ	ZINC
3U	LEAD		
61000	MAGNESIUM		

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51682 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-06 COLLECTION START: 10/16/90 1615 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y143

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
160U	ALUMINUM	7U	MANGANESE
24U	ANTIMONY	0.4UJ	MERCURY
2U	ARSENIC	6U	NICKEL
9U	BARIUM	6400	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
75000	CALCIUM	29000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
170U	IRON	60UJ	ZINC
8	LEAD		
22000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51684 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PW-01 COLLECTION START: 10/17/90 0935 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y147

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
40U	ALUMINUM	6U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
2U	ARSENIC	6U	NICKEL
8U	BARIUM	3700	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
83000	CALCIUM	55000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
20U	COPPER	3U	VANADIUM
390UJ	IRON	40UJ	ZINC
4U	LEAD		
40000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51677 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-02 COLLECTION START: 10/16/90 1415 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y141

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
16000	ALUMINUM	110	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
8U	ARSENIC	8U	NICKEL
120	BARIUM	13000	POTASSIUM
1U	BERYLLIUM	4UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
~~170000~~	~~CALCIUM~~	68000	SODIUM
28	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
110U	COPPER	30U	VANADIUM
14000J	IRON	130UJ	ZINC
14	LEAD		
46000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51646   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-04   COLLECTION START: 10/17/90 1620   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: MD NUMBER: Y167

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
40U	ALUMINUM	20U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
3U	ARSENIC	6U	NICKEL
20U	BARIUM	16000	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
160000	CALCIUM	110000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
5U	COPPER	4U	VANADIUM
170UJ	IRON	50UJ	ZINC
3U	LEAD		
58000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51644 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-05 COLLECTION START: 10/17/90 1645 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y169

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
80U	ALUMINUM	50U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
5U	ARSENIC	6U	NICKEL
29	BARIUM	68000	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
160000	CALCIUM	1500000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
4U	COPPER	3U	VANADIUM
240UJ	IRON	40UJ	ZINC
3U	LEAD		
220000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51656 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-06 COLLECTION START: 10/17/90 1440 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y157

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
150U	ALUMINUM	5U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
2U	ARSENIC	6U	NICKEL
30U	BARIUM	3700	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
150000	CALCIUM	42000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
5U	COPPER	3U	VANADIUM
220UJ	IRON	50UJ	ZINC
2U	LEAD		
66000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51654 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-07 COLLECTION START: 10/17/90 1515 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y161

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
50U	ALUMINUM	40U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
2U	ARSENIC	6U	NICKEL
20U	BARIUM	5300	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
180000	CALCIUM	100000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
200UJ	IRON	40UJ	ZINC
3U	LEAD		
59000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51647 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-08 COLLECTION START: 10/17/90 1605 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y165 **
** **
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
140U	ALUMINUM	52	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
3U	ARSENIC	6U	NICKEL
20U	BARIUM	6800	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
160000	CALCIUM	69000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
350UJ	IRON	50UJ	ZINC
4U	LEAD		
42000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

METALS DATA REPORT 12/04/90

PROJECT NO. 91-025 SAMPLE NO. 51651 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-09 COLLECTION START: 10/17/90 1515 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y163

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
27000	ALUMINUM	4100	MANGANESE
50U	ANTIMONY	0.20U	MERCURY
30UJ	ARSENIC	690	NICKEL
63	BARIUM	160000	POTASSIUM
23	BERYLLIUM	20UJ	SELENIUM
130	CADMIUM	5UJ	SILVER
670000	CALCIUM	1200000	SODIUM
360	CHROMIUM	13J	THALLIUM
210	COBALT	NA	TIN
20U	COPPER	820	VANADIUM
29000J	IRON	1400J	ZINC
35	LEAD		
200000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y158

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
30U	ALUMINUM	8U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
49	ARSENIC	11U	NICKEL
9U	BARIUM	89000	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
170000	CALCIUM	650000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
60UJ	IRON	40UJ	ZINC
3U	LEAD		
49000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51680  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON            **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO                 ST: FL              **
**   STATION ID: SS-01                                                COLLECTION START: 10/16/90  1520   STOP: 00/00/00  **
**   CASE.NO.: 15099           SAS NO.:                               D. NO.: Y138                MD NO: Y138            **
**                                                                                                                        **
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RESULTS	UNITS	PARAMETER
1.4U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51642 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PB-01 COLLECTION START: 10/15/90 0630 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y325

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
150U	ALUMINUM	2U	MANGANESE
24U	ANTIMONY	0.20UJ	MERCURY
2U	ARSENIC	6U	NICKEL
2U	BARIUM	72U	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
50U	CALCIUM	50U	SODIUM
6U	CHROMIUM	2UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
140UJ	IRON	60U	ZINC
4U	LEAD		
30U	MAGNESIUM		

REMARKS
RECOMMENDED HOLDING TIME EXCEEDED-HG

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51674 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-01 COLLECTION START: 10/16/90 1330 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y137 **
** **
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
340U	ALUMINUM	20U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
5U	~~ARSENIC~~	6U	NICKEL
20U	~~BARIUM~~	47000	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	~~CADMIUM~~	5UJ	SILVER
6[redacted]0	~~CALCIUM~~	1100000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
7U	COPPER	4U	VANADIUM
350UJ	IRON	40UJ	ZINC
5	LEAD		
140000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51685 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-02 COLLECTION START: 10/17/90 0925 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y144 MD NO: Y144 **
** **
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RESULTS	UNITS	PARAMETER
1.1U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51689 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-03 COLLECTION START: 10/17/90 1020 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y148 MD NO: Y148

RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51663  SAMPLE TYPE: SOIL       PROG ELEM: NSF   COLLECTED BY: M GORDON                  **
**   SOURCE: AMAX PHOSPHATE FACIL                                   CITY: PALMETTO             ST: FL                        **
**   STATION ID: SS-04                                              COLLECTION START: 10/18/90  1020   STOP: 00/00/00        **
**   CASE.NO.: 15099          SAS NO.:                              D. NO.: Y173               MD NO: Y173                   **
**                                                                                                                           **
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RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SS-05	COLLECTION START: 10/18/90 0900 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:	D. NO.: Y170 MD NO: Y170

RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-06 COLLECTION START: 10/17/90 1205 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y152 MD NO: Y152 **
** **
*** ***

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51667 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-07 COLLECTION START: 10/17/90 1150 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y153 MD NO: Y153

RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51681 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SB-01	COLLECTION START: 10/16/90 1535 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:	D. NO.: Y139 MD NO: Y139

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51686 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-02 COLLECTION START: 10/17/90 0945 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y145 MD NO: Y145

RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51671  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO            ST: FL                  **
**   STATION ID: SB-03                                                COLLECTION START: 10/17/90  1135   STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y149               MD NO: Y149            **
**                                                                                                                      **
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RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51661  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON                **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                     **
**   STATION ID: SB-04                                                COLLECTION START: 10/18/90  1030   STOP: 00/00/00      **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y174                MD NO: Y174                **
**                                                                                                                           **
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RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51665 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SB-05
COLLECTION START: 10/18/90 0910 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:
D. NO.: Y171 MD NO: Y171

RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51670  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON                   **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                        **
**   STATION ID: SB-06                                                COLLECTION START: 10/17/90  1215   STOP: 00/00/00         **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y155                MD NO: Y155                   **
**                                                                                                                              **
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RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51678 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-02 COLLECTION START: 10/16/90 1420 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y140 MD NO: Y140

RESULTS	UNITS	PARAMETER
3.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51645   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-04   COLLECTION START: 10/17/90 1630   STOP: 00/00/00
CASE.NO.: 15099   SAS NO.:   D. NO.: Y166   MD NO: Y166

RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51643  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON           **
**   SOURCE: AMAX PHOSPHATE FACIL                                   CITY: PALMETTO             ST: FL                   **
**   STATION ID: SD-05                                              COLLECTION START: 10/15/90  1655   STOP: 00/00/00   **
**   CASE.NO.: 15099         SAS NO.:                               D. NO.: Y168              MD NO: Y168               **
**                                                                                                                       **
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RESULTS	UNITS	PARAMETER
1.5U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51655   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-06   COLLECTION START: 10/17/90 1445   STOP: 00/00/00
CASE.NO.: 15099   SAS NO.:   D. NO.: Y156   MD NO: Y156

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-07 COLLECTION START: 10/17/90 1520 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y160 MD NO: Y160 **
** **
*** ***

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51648  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON                        **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO               ST: FL                            **
**   STATION ID: SD-08                                                COLLECTION START: 10/17/90  1610   STOP: 00/00/00              **
**   CASE.NO.: 15099         SAS NO.:                                 D. NO.: Y164               MD NO: Y164                         **
**                                                                                                                                   **
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RESULTS	UNITS	PARAMETER
1.5U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-09 COLLECTION START: 10/17/90 1530 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y162 MD NO: Y162

RESULTS	UNITS	PARAMETER
2.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-10 COLLECTION START: 10/17/90 1045 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y150 MD NO: Y150 **
**   **
*** ***

RESULTS	UNITS	PARAMETER
1.8U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-11 COLLECTION START: 10/17/90 1505 STOP: 00/00/00 **
** CASE NO.: 15099 SAS NO.: D. NO.: Y159 MD NO: Y159 **
** **
*** ***

RESULTS	UNITS	PARAMETER
2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-12 COLLECTION START: 10/17/90 1230 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y154 MD NO: Y154 **
** **

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RESULTS	UNITS	PARAMETER
1.6U	MG/KG	CYANIDE

FOOTNOTES

*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51683 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-01 COLLECTION START: 10/16/90 1625 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y142 MD NO: Y142

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51690  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON             **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO              ST: FL                   **
**   STATION ID: TW-02                                               COLLECTION START: 10/17/90  1040   STOP: 00/00/00    **
**   CASE.NO.: 15099         SAS NO.:                                D. NO.: Y146               MD NO: Y146               **
**                                                                                                                        **
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51684  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON        **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO             ST: FL               **
**   STATION ID: PW-01                                               COLLECTION START. 10/17/90  0935  STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y147              MD NO: Y147           **
**                                                                                                                   **
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51642  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON             **
**   SOURCE: AMAX PHOSPHATE FACIL                                      CITY: PALMETTO              ST: FL                   **
**   STATION ID: PB-01                                                 COLLECTION START: 10/15/90  0630   STOP: 00/00/00    **
**   CASE.NO.: 15099          SAS NO.:                                 D. NO.: Y325                MD NO: Y325              **
**                                                                                                                          **
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

REMARKS
RECOMMENDED HOLDING TIME EXCEEDED-HG

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-01
CASE.NO.: 15099 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1335 STOP: 00/00/00
D. NO.: Y136 MD NO: Y136

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51674 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-01 COLLECTION START: 10/16/90 1330 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y137 MD NO: Y137

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51677 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-02 COLLECTION START: 10/16/90 1415 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y141 MD NO: Y141 **
** **
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51646  SAMPLE TYPE: SURFACEWA    PROG ELEM: NSF    COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                      CITY: PALMETTO                ST: FL                 **
**   STATION ID: SW-04                                                 COLLECTION START: 10/17/90  1620   STOP: 00/00/00    **
**   CASE.NO.: 15099          SAS NO.:                                 D. NO.: Y167               MD NO: Y167               **
**                                                                                                                           **
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RESULTS	UNITS	PARAMETER
20U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51644  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON            **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO             ST: FL                  **
**   STATION ID: SW-05                                               COLLECTION START: 10/17/90  1645   STOP: 00/00/00  **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y169             MD NO: Y169               **
**                                                                                                                      **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51656 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-06 COLLECTION START: 10/17/90 1440 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y157 MD NO: Y157

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51654 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-07 COLLECTION START: 10/17/90 1515 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y161 MD NO: Y161

RESULTS	UNITS	PARAMETER
14	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51647  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO            ST: FL                     **
**   STATION ID: SW-08                                                COLLECTION START: 10/17/90  1605   STOP: 00/00/00    **
**   CASE.NO.: 15099           SAS NO.:                               D. NO.: Y165             MD NO: Y165                 **
**                                                                                                                         **
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RESULTS	UNITS	PARAMETER
100	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51651 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-09 COLLECTION START: 10/17/90 1515 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y163 MD NO: Y163 **
** **
*** ***

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y158 MD NO: Y158

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51680 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-01

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1520 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y138

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
14U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
14U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
14U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
14U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
14U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	14U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	14U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
14U	METHYL ETHYL KETONE	2J	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
14U	VINYL ACETATE	7U	STYRENE
7U	BROMODICHLOROMETHANE	7U	TOTAL XYLENES
		26	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51680 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-01 COLLECTION START: 10/16/90 1520 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y138

UG/KG	ANALYTICAL RESULTS
890U	PHENOL
890U	BIS(2-CHLOROETHYL) ETHER
890U	2-CHLOROPHENOL
890U	1,3-DICHLOROBENZENE
890U	1,4-DICHLOROBENZENE
890U	BENZYL ALCOHOL
890U	1,2-DICHLOROBENZENE
890U	2-METHYLPHENOL
890UR	BIS(2-CHLOROISOPROPYL) ETHER
890U	(3-AND/OR 4-)METHYLPHENOL
890U	N-NITROSODI-N-PROPYLAMINE
890U	HEXACHLOROETHANE
890UR	NITROBENZENE
890U	ISOPHORONE
890U	2-NITROPHENOL
890U	2,4-DIMETHYLPHENOL
4300U	BENZOIC ACID
890U	BIS(2-CHLOROETHOXY) METHANE
890U	2,4-DICHLOROPHENOL
890UR	1,2,4-TRICHLOROBENZENE
890U	NAPHTHALENE
890U	4-CHLOROANILINE
890U	HEXACHLOROBUTADIENE
890U	4-CHLORO-3-METHYLPHENOL
890U	2-METHYLNAPHTHALENE
890U	HEXACHLOROCYCLOPENTADIENE (HCCP)
890U	2,4,6-TRICHLOROPHENOL
4300U	2,4,5-TRICHLOROPHENOL
890UR	2-CHLORONAPHTHALENE
4300U	2-NITROANILINE
890U	DIMETHYL PHTHALATE
890U	ACENAPHTHYLENE
890U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
4300UR	3-NITROANILINE
890U	ACENAPHTHENE
4300U	2,4-DINITROPHENOL
4300U	4-NITROPHENOL
890U	DIBENZOFURAN
890U	2,4-DINITROTOLUENE
890U	DIETHYL PHTHALATE
890U	4-CHLOROPHENYL PHENYL ETHER
890U	FLUORENE
4300U	4-NITROANILINE
4300U	2-METHYL-4,6-DINITROPHENOL
890U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
890U	4 BROMOPHENYL PHENYL ETHER
890U	HEXACHLOROBENZENE (HCB)
4300U	PENTACHLOROPHENOL
890U	PHENANTHRENE
890U	ANTHRACENE
890U	DI-N-BUTYLPHTHALATE
890U	FLUORANTHENE
890U	PYRENE
890U	BENZYL BUTYL PHTHALATE
1800U	3,3'-DICHLOROBENZIDINE
890U	BENZO(A)ANTHRACENE
890U	CHRYSENE
890U	BIS(2-ETHYLHEXYL) PHTHALATE
890U	DI-N-OCTYLPHTHALATE
890U	BENZO(B AND/OR K)FLUORANTHENE
890U	BENZO-A-PYRENE
890U	INDENO (1,2,3-CD) PYRENE
890U	DIBENZO(A,H)ANTHRACENE
890U	BENZO(GHI)PERYLENE
26	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51680 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-01 COLLECTION START: 10/16/90 1520 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y138

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
22U	ALPHA-BHC	220U	METHOXYCHLOR
22U	BETA-BHC	43U	ENDRIN KETONE
22U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
22U	GAMMA-BHC (LINDANE)	220U	GAMMA-CHLORDANE /2
22U	HEPTACHLOR	220U	ALPHA-CHLORDANE /2
22U	ALDRIN	430U	TOXAPHENE
22U	HEPTACHLOR EPOXIDE	220U	PCB-1016 (AROCLOR 1016)
22U	ENDOSULFAN I (ALPHA)	220U	PCB-1221 (AROCLOR 1221)
43U	DIELDRIN	220U	PCB-1232 (AROCLOR 1232)
43U	4,4'-DDE (P,P'-DDE)	220U	PCB-1242 (AROCLOR 1242)
43U	ENDRIN	220U	PCB-1248 (AROCLOR 1248)
43U	ENDOSULFAN II (BETA)	430U	PCB-1254 (AROCLOR 1254)
43U	4,4'-DDD (P,P'-DDD)	430U	PCB-1260 (AROCLOR 1260)
43U	ENDOSULFAN SULFATE	26	PERCENT MOISTURE
43U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51680 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-01 COLLECTION START: 10/16/90 1520 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y138 MD NO: Y138 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

8000J 5 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51685 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-02

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 0925 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y144

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
11U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
11U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
11U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
11U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
11U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	11U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	11U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
11U	METHYL ETHYL KETONE	2J	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
11U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES
		8	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51685 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-02

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 0925 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y144

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
720U	PHENOL	3500UR	3-NITROANILINE
720U	BIS(2-CHLOROETHYL) ETHER	720U	ACENAPHTHENE
720U	2-CHLOROPHENOL	3500U	2,4-DINITROPHENOL
720U	1,3-DICHLOROBENZENE	3500U	4-NITROPHENOL
720U	1,4-DICHLOROBENZENE	720U	DIBENZOFURAN
720U	BENZYL ALCOHOL	720U	2,4-DINITROTOLUENE
720U	1,2-DICHLOROBENZENE	720U	DIETHYL PHTHALATE
720U	2-METHYLPHENOL	720U	4-CHLOROPHENYL PHENYL ETHER
720UR	BIS(2-CHLOROISOPROPYL) ETHER	720U	FLUORENE
720U	(3-AND/OR 4-)METHYLPHENOL	3500U	4-NITROANILINE
720U	N-NITROSODI-N-PROPYLAMINE	3500U	2-METHYL-4,6-DINITROPHENOL
720U	HEXACHLOROETHANE	720U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
720UR	NITROBENZENE	720U	4-BROMOPHENYL PHENYL ETHER
720U	ISOPHORONE	720U	HEXACHLOROBENZENE (HCB)
720U	2-NITROPHENOL	3500U	PENTACHLOROPHENOL
720U	2,4-DIMETHYLPHENOL	720U	PHENANTHRENE
3500U	BENZOIC ACID	720U	ANTHRACENE
720U	BIS(2-CHLOROETHOXY) METHANE	720U	DI-N-BUTYLPHTHALATE
720U	2,4-DICHLOROPHENOL	720U	FLUORANTHENE
720UR	1,2,4-TRICHLOROBENZENE	720U	PYRENE
720U	NAPHTHALENE	720U	BENZYL BUTYL PHTHALATE
720U	4-CHLOROANILINE	1400U	3,3'-DICHLOROBENZIDINE
720U	HEXACHLOROBUTADIENE	720U	BENZO(A)ANTHRACENE
720U	4-CHLORO-3-METHYLPHENOL	720U	CHRYSENE
720U	2-METHYLNAPHTHALENE	720U	BIS(2-ETHYLHEXYL) PHTHALATE
720U	HEXACHLOROCYCLOPENTADIENE (HCCP)	720U	DI-N-OCTYLPHTHALATE
720U	2,4,6-TRICHLOROPHENOL	720U	BENZO(B AND/OR K)FLUORANTHENE
3500U	2,4,5-TRICHLOROPHENOL	720U	BENZO-A-PYRENE
720UR	2-CHLORONAPHTHALENE	720U	INDENO (1,2,3-CD) PYRENE
3500U	2-NITROANILINE	720U	DIBENZO(A,H)ANTHRACENE
720U	DIMETHYL PHTHALATE	720U	BENZO(GHI)PERYLENE
720U	ACENAPHTHYLENE	8	PERCENT MOISTURE
720U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51685 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-02
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 0925 STOP: 00/00/00
D. NUMBER: Y144

UG/KG	ANALYTICAL RESULTS
17U	ALPHA-BHC
17U	BETA-BHC
17U	DELTA-BHC
17U	GAMMA-BHC (LINDANE)
17U	HEPTACHLOR
17U	ALDRIN
17U	HEPTACHLOR EPOXIDE
17U	ENDOSULFAN I (ALPHA)
35U	DIELDRIN
39	4,4'-DDE (P,P'-DDE)
35U	ENDRIN
35U	ENDOSULFAN II (BETA)
35U	4,4' DDD (P,P' DDD)
35U	ENDOSULFAN SULFATE
39	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
170U	METHOXYCHLOR
35U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
45J	GAMMA-CHLORDANE /2
52J	ALPHA-CHLORDANE /2
350U	TOXAPHENE
170U	PCB-1016 (AROCLOR 1016)
170U	PCB-1221 (AROCLOR 1221)
170U	PCB-1232 (AROCLOR 1232)
170U	PCB-1242 (AROCLOR 1242)
170U	PCB-1248 (AROCLOR 1248)
350U	PCB-1254 (AROCLOR 1254)
350U	PCB-1260 (AROCLOR 1260)
8	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51685  SAMPLE TYPE: SOIL          PROG ELEM: NSF    COLLECTED BY: M GORDON               **
**   SOURCE: AMAX PHOSPHATE FACIL                                       CITY: PALMETTO                ST: FL                   **
**   STATION ID: SS-02                                                  COLLECTION START: 10/17/90  0925   STOP: 00/00/00      **
**   CASE NO.: 15099          SAS NO.:                                  D. NO.: Y144                MD NO: Y144                **
**                                                                                                                             **
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ANALYTICAL RESULTS UG/KG

N	PETROLEUM PRODUCT
3000J	2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PESTICIDES/PCB'S DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51689 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-03 COLLECTION START: 10/17/90 1020 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y148

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
40U	DIELDRIN
40U	4,4'-DDE (P,P'-DDE)
40U	ENDRIN
40U	ENDOSULFAN II (BETA)
40U	4,4' DDD (P,P' DDD)
40U	ENDOSULFAN SULFATE
40U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
40U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
400U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
400U	PCB-1254 (AROCLOR 1254)
400U	PCB 1260 (AROCLOR 1260)
20	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51689  SAMPLE TYPE: SOIL       PROG ELEM: NSF   COLLECTED BY: M GORDON                     **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO                ST: FL                         **
**   STATION ID: SS-03                                                COLLECTION START: 10/17/90  1020   STOP: 00/00/00            **
**   CASE.NO.: 15099         SAS NO.:                                 D. NO.: Y148               MD NO: Y148                       **
**                                                                                                                                 **
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ANALYTICAL RESULTS UG/KG

8000J   6 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51689 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-03 COLLECTION START: 10/17/90 1020 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y148

UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE
13U	BROMOMETHANE
13U	VINYL CHLORIDE
13U	CHLOROETHANE
6U	METHYLENE CHLORIDE
13U	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
13U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
13U	VINYL ACETATE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
13U	METHYL ISOBUTYL KETONE
13U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
6U	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
20	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51689 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-03 COLLECTION START: 10/17/90 1020 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y148

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
820U	PHENOL	4000UR	3-NITROANILINE
820U	BIS(2-CHLOROETHYL) ETHER	820U	ACENAPHTHENE
820U	2-CHLOROPHENOL	4000U	2,4-DINITROPHENOL
820U	1,3-DICHLOROBENZENE	4000U	4-NITROPHENOL
820U	1,4-DICHLOROBENZENE	820U	DIBENZOFURAN
820U	BENZYL ALCOHOL	820U	2,4-DINITROTOLUENE
820U	1,2-DICHLOROBENZENE	820U	DIETHYL PHTHALATE
820U	2-METHYLPHENOL	820U	4-CHLOROPHENYL PHENYL ETHER
820UR	BIS(2-CHLOROISOPROPYL) ETHER	820U	FLUORENE
820U	(3-AND/OR 4-)METHYLPHENOL	4000U	4-NITROANILINE
820U	N-NITROSODI-N-PROPYLAMINE	4000U	2-METHYL-4,6-DINITROPHENOL
820U	HEXACHLOROETHANE	820U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
820UR	NITROBENZENE	820U	4-BROMOPHENYL PHENYL ETHER
820U	ISOPHORONE	820U	HEXACHLOROBENZENE (HCB)
820U	2-NITROPHENOL	4000U	PENTACHLOROPHENOL
820U	2,4-DIMETHYLPHENOL	820U	PHENANTHRENE
4000U	BENZOIC ACID	820U	ANTHRACENE
820U	BIS(2-CHLOROETHOXY) METHANE	820U	DI-N-BUTYLPHTHALATE
820U	2,4-DICHLOROPHENOL	820U	FLUORANTHENE
820UR	1,2,4-TRICHLOROBENZENE	820U	PYRENE
820U	NAPHTHALENE	820U	BENZYL BUTYL PHTHALATE
820U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
820U	HEXACHLOROBUTADIENE	820U	BENZO(A)ANTHRACENE
820U	4-CHLORO-3-METHYLPHENOL	820U	CHRYSENE
820U	2-METHYLNAPHTHALENE	820U	BIS(2-ETHYLHEXYL) PHTHALATE
820U	HEXACHLOROCYCLOPENTADIENE (HCCP)	820U	DI-N-OCTYLPHTHALATE
820U	2,4,6-TRICHLOROPHENOL	820U	BENZO(B AND/OR K)FLUORANTHENE
4000U	2,4,5-TRICHLOROPHENOL	820U	BENZO-A-PYRENE
820UR	2-CHLORONAPHTHALENE	820U	INDENO (1,2,3-CD) PYRENE
4000U	2-NITROANILINE	820U	DIBENZO(A,H)ANTHRACENE
820U	DIMETHYL PHTHALATE	820U	BENZO(GHI)PERYLENE
820U	ACENAPHTHYLENE	20	PERCENT MOISTURE
820U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y329 MD NO: Y329

RESULTS	UNITS	PARAMETER
10UJ	UG/L	CYANIDE

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51682 SAMPLE TYPE: GROUNDWA	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: MW-06	COLLECTION START: 10/16/90 1615 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:	D. NO.: Y143 MD NO: Y143

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-04
PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 1020 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y173

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
10U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
13U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	6J	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
13U	VINYL ACETATE	7U	STYRENE
7U	BROMODICHLOROMETHANE	7U	TOTAL XYLENES
		25	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-04 COLLECTION START: 10/18/90 1020 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y173

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
880U	PHENOL	4300UR	3-NITROANILINE
880U	BIS(2-CHLOROETHYL) ETHER	880UR	ACENAPHTHENE
880U	2-CHLOROPHENOL	4300U	2,4-DINITROPHENOL
880U	1,3-DICHLOROBENZENE	4300U	4-NITROPHENOL
880U	1,4-DICHLOROBENZENE	880U	DIBENZOFURAN
880U	BENZYL ALCOHOL	880U	2,4-DINITROTOLUENE
880U	1,2-DICHLOROBENZENE	880U	DIETHYL PHTHALATE
880U	2-METHYLPHENOL	880U	4-CHLOROPHENYL PHENYL ETHER
880UR	BIS(2-CHLOROISOPROPYL) ETHER	880U	FLUORENE
880U	(3-AND/OR 4-)METHYLPHENOL	4300U	4-NITROANILINE
880U	N-NITROSODI-N-PROPYLAMINE	4300U	2-METHYL-4,6-DINITROPHENOL
880U	HEXACHLOROETHANE	880U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
880UR	NITROBENZENE	880U	4 BROMOPHENYL PHENYL ETHER
880U	ISOPHORONE	880U	HEXACHLOROBENZENE (HCB)
880U	2-NITROPHENOL	4300U	PENTACHLOROPHENOL
880U	2,4-DIMETHYLPHENOL	880U	PHENANTHRENE
4300U	BENZOIC ACID	880U	ANTHRACENE
880U	BIS(2-CHLOROETHOXY) METHANE	880U	DI-N-BUTYLPHTHALATE
880U	2,4-DICHLOROPHENOL	880U	FLUORANTHENE
880UR	1,2,4-TRICHLOROBENZENE	880U	PYRENE
880U	NAPHTHALENE	880U	BENZYL BUTYL PHTHALATE
880U	4-CHLOROANILINE	1800U	3,3'-DICHLOROBENZIDINE
880U	HEXACHLOROBUTADIENE	880U	BENZO(A)ANTHRACENE
880U	4-CHLORO-3-METHYLPHENOL	880U	CHRYSENE
880U	2-METHYLNAPHTHALENE	880U	BIS(2-ETHYLHEXYL) PHTHALATE
880U	HEXACHLOROCYCLOPENTADIENE (HCCP)	880U	DI-N-OCTYLPHTHALATE
880U	2,4,6-TRICHLOROPHENOL	880U	BENZO(B AND/OR K)FLUORANTHENE
4300U	2,4,5-TRICHLOROPHENOL	880U	BENZO-A-PYRENE
880UR	2-CHLORONAPHTHALENE	880U	INDENO (1,2,3-CD) PYRENE
4300U	2-NITROANILINE	880U	DIBENZO(A,H)ANTHRACENE
880U	DIMETHYL PHTHALATE	880U	BENZO(GHI)PERYLENE
880U	ACENAPHTHYLENE	25	PERCENT MOISTURE
880U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-04
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 1020 STOP: 00/00/00
D. NUMBER: Y173

UG/KG	ANALYTICAL RESULTS
21U	ALPHA-BHC
21U	BETA-BHC
21U	DELTA-BHC
21U	GAMMA-BHC (LINDANE)
21U	HEPTACHLOR
21U	ALDRIN
21U	HEPTACHLOR EPOXIDE
21U	ENDOSULFAN I (ALPHA)
42U	DIELDRIN
42U	4,4'-DDE (P,P'-DDE)
42U	ENDRIN
42U	ENDOSULFAN II (BETA)
42U	4,4' DDD (P,P' DDD)
42U	ENDOSULFAN SULFATE
42U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
210U	METHOXYCHLOR
42U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
210U	GAMMA-CHLORDANE /2
210U	ALPHA-CHLORDANE /2
420U	TOXAPHENE
210U	PCB-1016 (AROCLOR 1016)
210U	PCB-1221 (AROCLOR 1221)
210U	PCB-1232 (AROCLOR 1232)
210U	PCB-1242 (AROCLOR 1242)
210U	PCB-1248 (AROCLOR 1248)
420U	PCB-1254 (AROCLOR 1254)
420U	PCB 1260 (AROCLOR 1260)
24	PERCENT MOISTURE

REMARKS

REMARKS

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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SS-04	COLLECTION START: 10/18/90 1020 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:	D. NO.: Y173 MD NO: Y173

ANALYTICAL RESULTS UG/KG

3000J 2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SS-05
COLLECTION START: 10/18/90 0900 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y170

UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE
12U	BROMOMETHANE
12U	VINYL CHLORIDE
12U	CHLOROETHANE
6U	METHYLENE CHLORIDE
12U	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
12U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
12U	VINYL ACETATE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
12U	METHYL ISOBUTYL KETONE
12U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
1J	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
14	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-05 COLLECTION START: 10/18/90 0900 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y170

UG/KG	ANALYTICAL RESULTS
770U	PHENOL
770U	BIS(2-CHLOROETHYL) ETHER
770U	2-CHLOROPHENOL
770U	1,3-DICHLOROBENZENE
770U	1,4-DICHLOROBENZENE
770U	BENZYL ALCOHOL
770U	1,2-DICHLOROBENZENE
770U	2-METHYLPHENOL
770UR	BIS(2-CHLOROISOPROPYL) ETHER
770U	(3-AND/OR 4-)METHYLPHENOL
770U	N-NITROSODI-N-PROPYLAMINE
770U	HEXACHLOROETHANE
770UR	NITROBENZENE
770U	ISOPHORONE
770U	2-NITROPHENOL
770U	2,4-DIMETHYLPHENOL
3700U	BENZOIC ACID
770U	BIS(2-CHLOROETHOXY) METHANE
770U	2,4-DICHLOROPHENOL
770UR	1,2,4-TRICHLOROBENZENE
770U	NAPHTHALENE
770U	4-CHLOROANILINE
770U	HEXACHLOROBUTADIENE
770U	4-CHLORO-3-METHYLPHENOL
770U	2-METHYLNAPHTHALENE
770U	HEXACHLOROCYCLOPENTADIENE (HCCP)
770U	2,4,6-TRICHLOROPHENOL
3700U	2,4,5-TRICHLOROPHENOL
770UR	2-CHLORONAPHTHALENE
3700U	2-NITROANILINE
770U	DIMETHYL PHTHALATE
770U	ACENAPHTHYLENE
770U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
3700UR	3-NITROANILINE
770UR	ACENAPHTHENE
3700U	2,4-DINITROPHENOL
3700U	4-NITROPHENOL
770U	DIBENZOFURAN
770U	2,4-DINITROTOLUENE
770U	DIETHYL PHTHALATE
770U	4-CHLOROPHENYL PHENYL ETHER
770U	FLUORENE
3700U	4-NITROANILINE
3700U	2-METHYL-4,6-DINITROPHENOL
770U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
770U	4-BROMOPHENYL PHENYL ETHER
770U	HEXACHLOROBENZENE (HCB)
3700U	PENTACHLOROPHENOL
770U	PHENANTHRENE
770U	ANTHRACENE
120J	DI-N-BUTYLPHTHALATE
770U	FLUORANTHENE
770U	PYRENE
770U	BENZYL BUTYL PHTHALATE
1500U	3,3'-DICHLOROBENZIDINE
770U	BENZO(A)ANTHRACENE
770U	CHRYSENE
770U	BIS(2-ETHYLHEXYL) PHTHALATE
770U	DI-N-OCTYLPHTHALATE
770U	BENZO(B AND/OR K)FLUORANTHENE
770U	BENZO-A-PYRENE
770U	INDENO (1,2,3-CD) PYRENE
770U	DIBENZO(A,H)ANTHRACENE
770U	BENZO(GHI)PERYLENE
14	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-05
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 0900 STOP: 00/00/00
D. NUMBER: Y170

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC	190U	METHOXYCHLOR
19U	BETA-BHC	37U	ENDRIN KETONE
19U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
19U	GAMMA-BHC (LINDANE)	190U	GAMMA-CHLORDANE /2
20U	HEPTACHLOR	190U	ALPHA-CHLORDANE /2
19U	ALDRIN	370U	TOXAPHENE
19U	HEPTACHLOR EPOXIDE	190U	PCB-1016 (AROCLOR 1016)
19U	ENDOSULFAN I (ALPHA)	190U	PCB-1221 (AROCLOR 1221)
37U	DIELDRIN	190U	PCB-1232 (AROCLOR 1232)
37U	4,4'-DDE (P,P'-DDE)	190U	PCB-1242 (AROCLOR 1242)
37U	ENDRIN	190U	PCB-1248 (AROCLOR 1248)
37U	ENDOSULFAN II (BETA)	370U	PCB-1254 (AROCLOR 1254)
37U	4,4'-DDD (P,P'-DDD)	370U	PCB-1260 (AROCLOR 1260)
37U	ENDOSULFAN SULFATE	14	PERCENT MOISTURE
37U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SS-05	COLLECTION START: 10/18/90 0900 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:	D. NO.: Y170 MD NO: Y170

ANALYTICAL RESULTS UG/KG

5000J	4 UNIDENTIFIED COMPOUNDS
N	PETROLEUM PRODUCT

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-06 COLLECTION START: 10/17/90 1205 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y152

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
13U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	1J	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
13U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		21	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-06 COLLECTION START: 10/17/90 1205 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y152

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
820U	PHENOL	4000UR	3-NITROANILINE
820U	BIS(2-CHLOROETHYL) ETHER	820U	ACENAPHTHENE
820U	2-CHLOROPHENOL	4000U	2,4-DINITROPHENOL
820U	1,3-DICHLOROBENZENE	4000U	4-NITROPHENOL
820U	1,4-DICHLOROBENZENE	820U	DIBENZOFURAN
820U	BENZYL ALCOHOL	820U	2,4-DINITROTOLUENE
820U	1,2-DICHLOROBENZENE	820U	DIETHYL PHTHALATE
820U	2-METHYLPHENOL	820U	4-CHLOROPHENYL PHENYL ETHER
820UR	BIS(2-CHLOROISOPROPYL) ETHER	820U	FLUORENE
820U	(3-AND/OR 4-)METHYLPHENOL	4000U	4-NITROANILINE
820U	N-NITROSODI-N-PROPYLAMINE	4000U	2-METHYL-4,6-DINITROPHENOL
820U	HEXACHLOROETHANE	820U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
820UR	NITROBENZENE	820U	4-BROMOPHENYL PHENYL ETHER
820U	ISOPHORONE	820U	HEXACHLOROBENZENE (HCB)
820U	2-NITROPHENOL	4000U	PENTACHLOROPHENOL
820U	2,4-DIMETHYLPHENOL	820U	PHENANTHRENE
4000U	BENZOIC ACID	820U	ANTHRACENE
820U	BIS(2-CHLOROETHOXY) METHANE	820U	DI-N-BUTYLPHTHALATE
820U	2,4-DICHLOROPHENOL	820U	FLUORANTHENE
820UR	1,2,4-TRICHLOROBENZENE	820U	PYRENE
820U	NAPHTHALENE	820U	BENZYL BUTYL PHTHALATE
820U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
820U	HEXACHLOROBUTADIENE	820U	BENZO(A)ANTHRACENE
820U	4-CHLORO-3-METHYLPHENOL	820U	CHRYSENE
820U	2-METHYLNAPHTHALENE	820U	BIS(2-ETHYLHEXYL) PHTHALATE
820U	HEXACHLOROCYCLOPENTADIENE (HCCP)	820U	DI-N-OCTYLPHTHALATE
820U	2,4,6-TRICHLOROPHENOL	820U	BENZO(B AND/OR K)FLUORANTHENE
4000U	2,4,5-TRICHLOROPHENOL	820U	BENZO-A-PYRENE
820UR	2-CHLORONAPHTHALENE	820U	INDENO (1,2,3-CD) PYRENE
4000U	2-NITROANILINE	820U	DIBENZO(A,H)ANTHRACENE
820U	DIMETHYL PHTHALATE	820U	BENZO(GHI)PERYLENE
820U	ACENAPHTHYLENE	20	PERCENT MOISTURE
820U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SS-06
COLLECTION START: 10/17/90 1205 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
D. NUMBER: Y152

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
40U	DIELDRIN
40U	4,4'-DDE (P,P'-DDE)
40U	ENDRIN
40U	ENDOSULFAN II (BETA)
40U	4,4'-DDD (P,P'-DDD)
40U	ENDOSULFAN SULFATE
40U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
40U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
400U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
400U	PCB-1254 (AROCLOR 1254)
400U	PCB-1260 (AROCLOR 1260)
20	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-06 COLLECTION START: 10/17/90 1205 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y152 MD NO: Y152 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

2000J 2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51667   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SS-07   COLLECTION START: 10/17/90 1150   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y153

UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE
12U	BROMOMETHANE
12U	VINYL CHLORIDE
12U	CHLOROETHANE
6U	METHYLENE CHLORIDE
12U	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
12U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
12U	VINYL ACETATE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
12U	METHYL ISOBUTYL KETONE
12U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
6U	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
17	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51667 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-07 COLLECTION START: 10/17/90 1150 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y153

UG/KG	ANALYTICAL RESULTS
480J	PHENOL
800U	BIS(2-CHLOROETHYL) ETHER
800U	2-CHLOROPHENOL
800U	1,3-DICHLOROBENZENE
800U	1,4-DICHLOROBENZENE
800U	BENZYL ALCOHOL
800U	1,2-DICHLOROBENZENE
800U	2-METHYLPHENOL
800UR	BIS(2-CHLOROISOPROPYL) ETHER
800U	(3-AND/OR 4-)METHYLPHENOL
800U	N-NITROSODI-N-PROPYLAMINE
800U	HEXACHLOROETHANE
800UR	NITROBENZENE
800U	ISOPHORONE
800U	2-NITROPHENOL
800U	2,4-DIMETHYLPHENOL
3900U	BENZOIC ACID
800U	BIS(2-CHLOROETHOXY) METHANE
800U	2,4-DICHLOROPHENOL
800UR	1,2,4-TRICHLOROBENZENE
800U	NAPHTHALENE
800U	4-CHLOROANILINE
800U	HEXACHLOROBUTADIENE
800U	4-CHLORO-3-METHYLPHENOL
800U	2-METHYLNAPHTHALENE
800U	HEXACHLOROCYCLOPENTADIENE (HCCP)
800U	2,4,6-TRICHLOROPHENOL
3900U	2,4,5-TRICHLOROPHENOL
800UR	2-CHLORONAPHTHALENE
3900U	2-NITROANILINE
800U	DIMETHYL PHTHALATE
800U	ACENAPHTHYLENE
800U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
3900UR	3-NITROANILINE
800U	ACENAPHTHENE
3900U	2,4-DINITROPHENOL
3900U	4-NITROPHENOL
800U	DIBENZOFURAN
800U	2,4-DINITROTOLUENE
800U	DIETHYL PHTHALATE
800U	4-CHLOROPHENYL PHENYL ETHER
800U	FLUORENE
3900U	4-NITROANILINE
3900U	2-METHYL-4,6-DINITROPHENOL
800U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
800U	4-BROMOPHENYL PHENYL ETHER
800U	HEXACHLOROBENZENE (HCB)
3900U	PENTACHLOROPHENOL
800U	PHENANTHRENE
800U	ANTHRACENE
800U	DI-N-BUTYLPHTHALATE
800U	FLUORANTHENE
800U	PYRENE
800U	BENZYL BUTYL PHTHALATE
1600U	3,3'-DICHLOROBENZIDINE
800U	BENZO(A)ANTHRACENE
800U	CHRYSENE
800U	BIS(2-ETHYLHEXYL) PHTHALATE
800U	DI-N-OCTYLPHTHALATE
800U	BENZO(B AND/OR K)FLUORANTHENE
800U	BENZO-A-PYRENE
800U	INDENO (1,2,3-CD) PYRENE
800U	DIBENZO(A,H)ANTHRACENE
800U	BENZO(GHI)PERYLENE
17	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51667 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-07
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1150 STOP: 00/00/00
D. NUMBER: Y153

UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC
19U	BETA-BHC
19U	DELTA-BHC
19U	GAMMA-BHC (LINDANE)
19U	HEPTACHLOR
19U	ALDRIN
19U	HEPTACHLOR EPOXIDE
19U	ENDOSULFAN I (ALPHA)
39U	DIELDRIN
39U	4,4'-DDE (P,P'-DDE)
39U	ENDRIN
39U	ENDOSULFAN II (BETA)
39U	4,4'-DDD (P,P'-DDD)
39U	ENDOSULFAN SULFATE
39U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
190U	METHOXYCHLOR
39U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
190U	GAMMA-CHLORDANE /2
190U	ALPHA-CHLORDANE /2
390U	TOXAPHENE
190U	PCB-1016 (AROCLOR 1016)
190U	PCB-1221 (AROCLOR 1221)
190U	PCB-1232 (AROCLOR 1232)
190U	PCB-1242 (AROCLOR 1242)
190U	PCB-1248 (AROCLOR 1248)
390U	PCB-1254 (AROCLOR 1254)
390U	PCB-1260 (AROCLOR 1260)
17	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51667 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SS-07
COLLECTION START: 10/17/90 1150 STOP: 00/00/00
CASE NO.: 15099 SAS NO.:
D. NO.: Y153 MD NO: Y153

ANALYTICAL RESULTS UG/KG

1000J	1 UNIDENTIFIED COMPOUND
2000JN	DODECANOIC ACID
4000JN	HEXADECANOIC ACID

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51681 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-01 COLLECTION START: 10/16/90 1535 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y139

UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE
12U	BROMOMETHANE
12U	VINYL CHLORIDE
12U	CHLOROETHANE
7U	METHYLENE CHLORIDE
12U	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
12U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
12U	VINYL ACETATE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
12U	METHYL ISOBUTYL KETONE
12U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
6U	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
18	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51681 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-01 COLLECTION START: 10/16/90 1535 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y139

UG/KG	ANALYTICAL RESULTS
800U	PHENOL
800U	BIS(2-CHLOROETHYL) ETHER
800U	2-CHLOROPHENOL
800U	1,3-DICHLOROBENZENE
800U	1,4-DICHLOROBENZENE
800U	BENZYL ALCOHOL
800U	1,2-DICHLOROBENZENE
800U	2-METHYLPHENOL
800UR	BIS(2-CHLOROISOPROPYL) ETHER
800U	(3-AND/OR 4-)METHYLPHENOL
800U	N-NITROSODI-N-PROPYLAMINE
800U	HEXACHLOROETHANE
800UR	NITROBENZENE
800U	ISOPHORONE
800U	2-NITROPHENOL
800U	2,4-DIMETHYLPHENOL
3900U	BENZOIC ACID
800U	BIS(2-CHLOROETHOXY) METHANE
800U	2,4-DICHLOROPHENOL
800UR	1,2,4-TRICHLOROBENZENE
800U	NAPHTHALENE
800U	4-CHLOROANILINE
800U	HEXACHLOROBUTADIENE
800U	4-CHLORO-3-METHYLPHENOL
800U	2-METHYLNAPHTHALENE
800U	HEXACHLOROCYCLOPENTADIENE (HCCP)
800U	2,4,6-TRICHLOROPHENOL
3900U	2,4,5-TRICHLOROPHENOL
800UR	2-CHLORONAPHTHALENE
3900U	2-NITROANILINE
800U	DIMETHYL PHTHALATE
800U	ACENAPHTHYLENE
800U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
3900UR	3-NITROANILINE
800U	ACENAPHTHENE
3900U	2,4-DINITROPHENOL
3900U	4-NITROPHENOL
800U	DIBENZOFURAN
800U	2,4-DINITROTOLUENE
800U	DIETHYL PHTHALATE
800U	4-CHLOROPHENYL PHENYL ETHER
800U	FLUORENE
3900U	4-NITROANILINE
3900U	2-METHYL-4,6-DINITROPHENOL
800U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
800U	4-BROMOPHENYL PHENYL ETHER
800U	HEXACHLOROBENZENE (HCB)
3900U	PENTACHLOROPHENOL
800U	PHENANTHRENE
800U	ANTHRACENE
800U	DI-N-BUTYLPHTHALATE
800U	FLUORANTHENE
800U	PYRENE
800U	BENZYL BUTYL PHTHALATE
1600U	3,3'-DICHLOROBENZIDINE
800U	BENZO(A)ANTHRACENE
800U	CHRYSENE
800U	BIS(2-ETHYLHEXYL) PHTHALATE
800U	DI-N-OCTYLPHTHALATE
800U	BENZO(B AND/OR K)FLUORANTHENE
800U	BENZO-A-PYRENE
800U	INDENO (1,2,3-CD) PYRENE
800U	DIBENZO(A,H)ANTHRACENE
800U	BENZO(GHI)PERYLENE
18	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51681 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-01
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1535 STOP: 00/00/00
D. NUMBER: Y139

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
39U	DIELDRIN
39U	4,4'-DDE (P,P'-DDE)
39U	ENDRIN
39U	ENDOSULFAN II (BETA)
39U	4,4'-DDD (P,P'-DDD)
39U	ENDOSULFAN SULFATE
39U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
39U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
390U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
390U	PCB-1254 (AROCLOR 1254)
390U	PCB-1260 (AROCLOR 1260)
18	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51686   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SB-02   COLLECTION START: 10/17/90 0945   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y145

UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE
12U	BROMOMETHANE
12U	VINYL CHLORIDE
12U	CHLOROETHANE
6U	METHYLENE CHLORIDE
12U	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
12U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
12U	VINYL ACETATE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
12U	METHYL ISOBUTYL KETONE
12U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
6U	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
16	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51686 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-02 COLLECTION START: 10/17/90 0945 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y145

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
790U	PHENOL	3800UR	3-NITROANILINE
790U	BIS(2-CHLOROETHYL) ETHER	790U	ACENAPHTHENE
790U	2-CHLOROPHENOL	3800U	2,4-DINITROPHENOL
790U	1,3-DICHLOROBENZENE	3800U	4-NITROPHENOL
790U	1,4-DICHLOROBENZENE	790U	DIBENZOFURAN
790U	BENZYL ALCOHOL	790U	2,4-DINITROTOLUENE
790U	1,2-DICHLOROBENZENE	790U	DIETHYL PHTHALATE
790U	2-METHYLPHENOL	790U	4-CHLOROPHENYL PHENYL ETHER
790UR	BIS(2-CHLOROISOPROPYL) ETHER	790U	FLUORENE
790U	(3-AND/OR 4-)METHYLPHENOL	3800U	4-NITROANILINE
790U	N-NITROSODI-N-PROPYLAMINE	3800U	2-METHYL-4,6-DINITROPHENOL
790U	HEXACHLOROETHANE	790U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
790UR	NITROBENZENE	790U	4 BROMOPHENYL PHENYL ETHER
790U	ISOPHORONE	790U	HEXACHLOROBENZENE (HCB)
790U	2-NITROPHENOL	3800U	PENTACHLOROPHENOL
790U	2,4-DIMETHYLPHENOL	790U	PHENANTHRENE
3800U	BENZOIC ACID	790U	ANTHRACENE
790U	BIS(2-CHLOROETHOXY) METHANE	790U	DI-N-BUTYLPHTHALATE
790U	2,4-DICHLOROPHENOL	790U	FLUORANTHENE
790UR	1,2,4-TRICHLOROBENZENE	790U	PYRENE
790U	NAPHTHALENE	790U	BENZYL BUTYL PHTHALATE
790U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
790U	HEXACHLOROBUTADIENE	790U	BENZO(A)ANTHRACENE
790U	4-CHLORO-3-METHYLPHENOL	790U	CHRYSENE
790U	2-METHYLNAPHTHALENE	790U	BIS(2-ETHYLHEXYL) PHTHALATE
790U	HEXACHLOROCYCLOPENTADIENE (HCCP)	790U	DI-N-OCTYLPHTHALATE
790U	2,4,6-TRICHLOROPHENOL	790U	BENZO(B AND/OR K)FLUORANTHENE
3800U	2,4,5-TRICHLOROPHENOL	790U	BENZO-A-PYRENE
790UR	2-CHLORONAPHTHALENE	790U	INDENO (1,2,3-CD) PYRENE
3800U	2-NITROANILINE	790U	DIBENZO(A,H)ANTHRACENE
790U	DIMETHYL PHTHALATE	790U	BENZO(GHI)PERYLENE
790U	ACENAPHTHYLENE	16	PERCENT MOISTURE
790U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51686 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-02
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 0945 STOP: 00/00/00
D. NUMBER: Y145

UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC
19U	BETA-BHC
19U	DELTA-BHC
19U	GAMMA-BHC (LINDANE)
19U	HEPTACHLOR
19U	ALDRIN
19U	HEPTACHLOR EPOXIDE
19U	ENDOSULFAN I (ALPHA)
38U	DIELDRIN
38U	4,4'-DDE (P,P'-DDE)
38U	ENDRIN
38U	ENDOSULFAN II (BETA)
38U	4,4' DDD (P,P'-DDD)
38U	ENDOSULFAN SULFATE
38U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
190U	METHOXYCHLOR
38U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
190U	GAMMA-CHLORDANE /2
190U	ALPHA-CHLORDANE /2
380U	TOXAPHENE
190U	PCB-1016 (AROCLOR 1016)
190U	PCB-1221 (AROCLOR 1221)
190U	PCB-1232 (AROCLOR 1232)
190U	PCB-1242 (AROCLOR 1242)
190U	PCB-1248 (AROCLOR 1248)
380U	PCB-1254 (AROCLOR 1254)
380U	PCB-1260 (AROCLOR 1260)
16	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51686 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SB-02 COLLECTION START: 10/17/90 0945 STOP: 00/00/00 **
** CASE NO.: 15099 SAS NO.: D. NO.: Y145 MD NO: Y145 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

800J 1 UNIDENTIFIED COMPOUNDS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51671 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-03 COLLECTION START: 10/17/90 1135 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y149

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
12U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		19	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51671 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-03

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1135 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y149

UG/KG	ANALYTICAL RESULTS
810U	PHENOL
810U	BIS(2-CHLOROETHYL) ETHER
810U	2-CHLOROPHENOL
810U	1,3-DICHLOROBENZENE
810U	1,4-DICHLOROBENZENE
810U	BENZYL ALCOHOL
810U	1,2-DICHLOROBENZENE
810U	2-METHYLPHENOL
810UR	BIS(2-CHLOROISOPROPYL) ETHER
810U	(3-AND/OR 4-)METHYLPHENOL
810U	N-NITROSODI-N-PROPYLAMINE
810U	HEXACHLOROETHANE
810UR	NITROBENZENE
810U	ISOPHORONE
810U	2-NITROPHENOL
810U	2,4-DIMETHYLPHENOL
4000U	BENZOIC ACID
810U	BIS(2-CHLOROETHOXY) METHANE
810U	2,4-DICHLOROPHENOL
810UR	1,2,4-TRICHLOROBENZENE
810U	NAPHTHALENE
810U	4-CHLOROANILINE
810U	HEXACHLOROBUTADIENE
810U	4-CHLORO-3-METHYLPHENOL
810U	2-METHYLNAPHTHALENE
810U	HEXACHLOROCYCLOPENTADIENE (HCCP)
810U	2,4,6-TRICHLOROPHENOL
4000U	2,4,5-TRICHLOROPHENOL
810UR	2-CHLORONAPHTHALENE
4000U	2-NITROANILINE
810U	DIMETHYL PHTHALATE
810U	ACENAPHTHYLENE
810U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
4000UR	3-NITROANILINE
810U	ACENAPHTHENE
4000U	2,4-DINITROPHENOL
4000U	4-NITROPHENOL
810U	DIBENZOFURAN
810U	2,4-DINITROTOLUENE
810U	DIETHYL PHTHALATE
810U	4-CHLOROPHENYL PHENYL ETHER
810U	FLUORENE
4000U	4-NITROANILINE
4000U	2-METHYL-4,6-DINITROPHENOL
810U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
810U	4 BROMOPHENYL PHENYL ETHER
810U	HEXACHLOROBENZENE (HCB)
4000U	PENTACHLOROPHENOL
810U	PHENANTHRENE
810U	ANTHRACENE
810U	DI-N-BUTYLPHTHALATE
810U	FLUORANTHENE
810U	PYRENE
810U	BENZYL BUTYL PHTHALATE
1600U	3,3'-DICHLOROBENZIDINE
810U	BENZO(A)ANTHRACENE
810U	CHRYSENE
810U	BIS(2-ETHYLHEXYL) PHTHALATE
810U	DI-N-OCTYLPHTHALATE
810U	BENZO(B AND/OR K)FLUORANTHENE
810U	BENZO-A-PYRENE
810U	INDENO (1,2,3-CD) PYRENE
810U	DIBENZO(A,H)ANTHRACENE
810U	BENZO(GHI)PERYLENE
19	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51671   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SB-03   COLLECTION START: 10/17/90 1135   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y149

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC	200U	METHOXYCHLOR
20U	BETA-BHC	40U	ENDRIN KETONE
20U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
20U	GAMMA-BHC (LINDANE)	200U	GAMMA-CHLORDANE /2
20U	HEPTACHLOR	200U	ALPHA-CHLORDANE /2
20U	ALDRIN	400U	TOXAPHENE
20U	HEPTACHLOR EPOXIDE	200U	PCB-1016 (AROCLOR 1016)
20U	ENDOSULFAN I (ALPHA)	200U	PCB-1221 (AROCLOR 1221)
40U	DIELDRIN	200U	PCB-1232 (AROCLOR 1232)
40U	4,4'-DDE (P,P'-DDE)	200U	PCB-1242 (AROCLOR 1242)
40U	ENDRIN	200U	PCB-1248 (AROCLOR 1248)
40U	ENDOSULFAN II (BETA)	400U	PCB-1254 (AROCLOR 1254)
40U	4,4'-DDD (P,P'-DDD)	400U	PCB-1260 (AROCLOR 1260)
40U	ENDOSULFAN SULFATE	19	PERCENT MOISTURE
40U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51671  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO               ST: FL                  **
**   STATION ID: SB-03                                                COLLECTION START: 10/17/90  1135   STOP: 00/00/00    **
**   CASE.NO.: 15099         SAS NO.:                                 D. NO.: Y149                MD NO: Y149              **
**                                                                                                                         **
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ANALYTICAL RESULTS UG/KG

2000J   2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51661 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-04 COLLECTION START: 10/18/90 1030 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y174

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
12U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		18	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51661 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-04 COLLECTION START: 10/18/90 1030 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y174

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
800U	PHENOL	3900UR	3-NITROANILINE
800U	BIS(2-CHLOROETHYL) ETHER	800UR	ACENAPHTHENE
800U	2-CHLOROPHENOL	3900U	2,4-DINITROPHENOL
800U	1,3-DICHLOROBENZENE	3900U	4-NITROPHENOL
800U	1,4-DICHLOROBENZENE	800U	DIBENZOFURAN
800U	BENZYL ALCOHOL	800U	2,4-DINITROTOLUENE
800U	1,2-DICHLOROBENZENE	800U	DIETHYL PHTHALATE
800U	2-METHYLPHENOL	800U	4-CHLOROPHENYL PHENYL ETHER
800UR	BIS(2-CHLOROISOPROPYL) ETHER	800U	FLUORENE
800U	(3-AND/OR 4-)METHYLPHENOL	3900U	4-NITROANILINE
800U	N-NITROSODI-N-PROPYLAMINE	3900U	2-METHYL-4,6-DINITROPHENOL
800U	HEXACHLOROETHANE	800U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
800UR	NITROBENZENE	800U	4-BROMOPHENYL PHENYL ETHER
800U	ISOPHORONE	800U	HEXACHLOROBENZENE (HCB)
800U	2-NITROPHENOL	3900U	PENTACHLOROPHENOL
800U	2,4-DIMETHYLPHENOL	800U	PHENANTHRENE
3900U	BENZOIC ACID	800U	ANTHRACENE
800U	BIS(2-CHLOROETHOXY) METHANE	800U	DI-N-BUTYLPHTHALATE
800U	2,4-DICHLOROPHENOL	800U	FLUORANTHENE
800UR	1,2,4-TRICHLOROBENZENE	800U	PYRENE
800U	NAPHTHALENE	800U	BENZYL BUTYL PHTHALATE
800U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
800U	HEXACHLOROBUTADIENE	800U	BENZO(A)ANTHRACENE
800U	4-CHLORO-3-METHYLPHENOL	800U	CHRYSENE
800U	2-METHYLNAPHTHALENE	800U	BIS(2-ETHYLHEXYL) PHTHALATE
800U	HEXACHLOROCYCLOPENTADIENE (HCCP)	800U	DI-N-OCTYLPHTHALATE
800U	2,4,6-TRICHLOROPHENOL	800U	BENZO(B AND/OR K)FLUORANTHENE
3900U	2,4,5-TRICHLOROPHENOL	800U	BENZO-A-PYRENE
800UR	2-CHLORONAPHTHALENE	800U	INDENO (1,2,3-CD) PYRENE
3900U	2-NITROANILINE	800U	DIBENZO(A,H)ANTHRACENE
800U	DIMETHYL PHTHALATE	800U	BENZO(GHI)PERYLENE
800U	ACENAPHTHYLENE	18	PERCENT MOISTURE
800U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51661 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-04
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 1030 STOP: 00/00/00
D. NUMBER: Y174

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
30U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
39U	DIELDRIN
39U	4,4'-DDE (P,P'-DDE)
39U	ENDRIN
39U	ENDOSULFAN II (BETA)
39U	4,4'-DDD (P,P'-DDD)
39U	ENDOSULFAN SULFATE
39U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
39U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
390U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
390U	PCB-1254 (AROCLOR 1254)
390U	PCB-1260 (AROCLOR 1260)
18	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51665   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SB-05   COLLECTION START: 10/18/90 0910   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y171

UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE
12U	BROMOMETHANE
12U	VINYL CHLORIDE
12U	CHLOROETHANE
6U	METHYLENE CHLORIDE
20U	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
12U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
12U	VINYL ACETATE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
12U	METHYL ISOBUTYL KETONE
12U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
6U	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
16	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51665 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-05
PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 0910 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y171

UG/KG	ANALYTICAL RESULTS
790U	PHENOL
790U	BIS(2-CHLOROETHYL) ETHER
790U	2-CHLOROPHENOL
790U	1,3-DICHLOROBENZENE
790U	1,4-DICHLOROBENZENE
790U	BENZYL ALCOHOL
790U	1,2-DICHLOROBENZENE
790U	2-METHYLPHENOL
790UR	BIS(2-CHLOROISOPROPYL) ETHER
790U	(3-AND/OR 4-)METHYLPHENOL
790U	N-NITROSODI-N-PROPYLAMINE
790U	HEXACHLOROETHANE
790UR	NITROBENZENE
790U	ISOPHORONE
790U	2-NITROPHENOL
790U	2,4-DIMETHYLPHENOL
3800U	BENZOIC ACID
790U	BIS(2-CHLOROETHOXY) METHANE
790U	2,4-DICHLOROPHENOL
790UR	1,2,4-TRICHLOROBENZENE
790U	NAPHTHALENE
790U	4-CHLOROANILINE
790U	HEXACHLOROBUTADIENE
790U	4-CHLORO-3-METHYLPHENOL
790U	2-METHYLNAPHTHALENE
790U	HEXACHLOROCYCLOPENTADIENE (HCCP)
790U	2,4,6-TRICHLOROPHENOL
3800U	2,4,5-TRICHLOROPHENOL
790UR	2-CHLORONAPHTHALENE
3800U	2-NITROANILINE
790U	DIMETHYL PHTHALATE
790U	ACENAPHTHYLENE
790U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
3800UR	3-NITROANILINE
790UR	ACENAPHTHENE
3800U	2,4-DINITROPHENOL
3800U	4-NITROPHENOL
790U	DIBENZOFURAN
790U	2,4-DINITROTOLUENE
790U	DIETHYL PHTHALATE
790U	4-CHLOROPHENYL PHENYL ETHER
790U	FLUORENE
3800U	4-NITROANILINE
3800U	2-METHYL-4,6-DINITROPHENOL
790U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
790U	4-BROMOPHENYL PHENYL ETHER
790U	HEXACHLOROBENZENE (HCB)
3800U	PENTACHLOROPHENOL
790U	PHENANTHRENE
790U	ANTHRACENE
790U	DI-N-BUTYLPHTHALATE
790U	FLUORANTHENE
790U	PYRENE
790U	BENZYL BUTYL PHTHALATE
1600U	3,3'-DICHLOROBENZIDINE
790U	BENZO(A)ANTHRACENE
790U	CHRYSENE
790U	BIS(2-ETHYLHEXYL) PHTHALATE
790U	DI-N-OCTYLPHTHALATE
790U	BENZO(B AND/OR K)FLUORANTHENE
790U	BENZO-A-PYRENE
790U	INDENO (1,2,3-CD) PYRENE
790U	DIBENZO(A,H)ANTHRACENE
790U	BENZO(GHI)PERYLENE
16	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51665 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-05
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 0910 STOP: 00/00/00
D. NUMBER: Y171

UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC
19U	BETA-BHC
19U	DELTA-BHC
19U	GAMMA-BHC (LINDANE)
19U	HEPTACHLOR
19U	ALDRIN
19U	HEPTACHLOR EPOXIDE
19U	ENDOSULFAN I (ALPHA)
38U	DIELDRIN
38U	4,4'-DDE (P,P'-DDE)
38U	ENDRIN
38U	ENDOSULFAN II (BETA)
38U	4,4'-DDD (P,P'-DDD)
38U	ENDOSULFAN SULFATE
38U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
190U	METHOXYCHLOR
38U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
190U	GAMMA-CHLORDANE /2
190U	ALPHA-CHLORDANE /2
380U	TOXAPHENE
190U	PCB-1016 (AROCLOR 1016)
190U	PCB-1221 (AROCLOR 1221)
190U	PCB-1232 (AROCLOR 1232)
190U	PCB-1242 (AROCLOR 1242)
190U	PCB-1248 (AROCLOR 1248)
380U	PCB-1254 (AROCLOR 1254)
380U	PCB-1260 (AROCLOR 1260)
16	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE: PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: CITY: PALMETTO ST: FL
STATION ID: SB-06 COLLECTION START: 10/17/90 1215 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y155

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
12U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	3J	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		16	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE:
SOURCE:
STATION ID: SB-06

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1215 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y155

UG/KG	ANALYTICAL RESULTS
790U	PHENOL
790U	BIS(2-CHLOROETHYL) ETHER
790U	2-CHLOROPHENOL
790U	1,3-DICHLOROBENZENE
790U	1,4-DICHLOROBENZENE
790U	BENZYL ALCOHOL
790U	1,2-DICHLOROBENZENE
790U	2-METHYLPHENOL
790UR	BIS(2-CHLOROISOPROPYL) ETHER
790U	(3-AND/OR 4-)METHYLPHENOL
790U	N-NITROSODI-N-PROPYLAMINE
790U	HEXACHLOROETHANE
790UR	NITROBENZENE
790U	ISOPHORONE
790U	2-NITROPHENOL
790U	2,4-DIMETHYLPHENOL
3800U	BENZOIC ACID
790U	BIS(2-CHLOROETHOXY) METHANE
790U	2,4-DICHLOROPHENOL
790UR	1,2,4-TRICHLOROBENZENE
790U	NAPHTHALENE
790U	4-CHLOROANILINE
790U	HEXACHLOROBUTADIENE
790U	4-CHLORO-3-METHYLPHENOL
790U	2-METHYLNAPHTHALENE
790U	HEXACHLOROCYCLOPENTADIENE (HCCP)
790U	2,4,6-TRICHLOROPHENOL
3800U	2,4,5-TRICHLOROPHENOL
790UR	2-CHLORONAPHTHALENE
3800U	2-NITROANILINE
790U	DIMETHYL PHTHALATE
790U	ACENAPHTHYLENE
790U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
3800UR	3-NITROANILINE
790U	ACENAPHTHENE
3800U	2,4-DINITROPHENOL
3800U	4-NITROPHENOL
790U	DIBENZOFURAN
790U	2,4-DINITROTOLUENE
790U	DIETHYL PHTHALATE
790U	4-CHLOROPHENYL PHENYL ETHER
790U	FLUORENE
3800U	4-NITROANILINE
3800U	2-METHYL-4,6-DINITROPHENOL
790U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
790U	4 BROMOPHENYL PHENYL ETHER
790U	HEXACHLOROBENZENE (HCB)
3800U	PENTACHLOROPHENOL
790U	PHENANTHRENE
790U	ANTHRACENE
790U	DI-N-BUTYLPHTHALATE
790U	FLUORANTHENE
790U	PYRENE
790U	BENZYL BUTYL PHTHALATE
1600U	3,3'-DICHLOROBENZIDINE
790U	BENZO(A)ANTHRACENE
790U	CHRYSENE
790U	BIS(2-ETHYLHEXYL) PHTHALATE
790U	DI-N-OCTYLPHTHALATE
790U	BENZO(B AND/OR K)FLUORANTHENE
790U	BENZO-A-PYRENE
790U	INDENO (1,2,3-CD) PYRENE
790U	DIBENZO(A,H)ANTHRACENE
790U	BENZO(GHI)PERYLENE
16	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE:
SOURCE:
STATION ID: SB-06
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1215 STOP: 00/00/00
D. NUMBER: Y155

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC	190U	METHOXYCHLOR
19U	BETA-BHC	38U	ENDRIN KETONE
19U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
19U	GAMMA-BHC (LINDANE)	190U	GAMMA-CHLORDANE /2
19U	HEPTACHLOR	190U	ALPHA-CHLORDANE /2
19U	ALDRIN	380U	TOXAPHENE
19U	HEPTACHLOR EPOXIDE	190U	PCB-1016 (AROCLOR 1016)
19U	ENDOSULFAN I (ALPHA)	190U	PCB-1221 (AROCLOR 1221)
38U	DIELDRIN	190U	PCB-1232 (AROCLOR 1232)
38U	4,4'-DDE (P,P'-DDE)	190U	PCB-1242 (AROCLOR 1242)
38U	ENDRIN	190U	PCB-1248 (AROCLOR 1248)
38U	ENDOSULFAN II (BETA)	380U	PCB-1254 (AROCLOR 1254)
38U	4,4'-DDD (P,P'-DDD)	380U	PCB-1260 (AROCLOR 1260)
38U	ENDOSULFAN SULFATE	16	PERCENT MOISTURE
38U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE:	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE:	CITY: PALMETTO ST: FL
STATION ID: SB-06	COLLECTION START: 10/17/90 1215 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:	D. NO.: Y155 MD NO: Y155

ANALYTICAL RESULTS UG/KG

1000J 1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-01 COLLECTION START: 10/16/90 1335 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y136

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
41U	DIELDRIN
41U	4,4'-DDE (P,P'-DDE)
41U	ENDRIN
41U	ENDOSULFAN II (BETA)
41U	4,4'-DDD (P,P'-DDD)
41U	ENDOSULFAN SULFATE
41U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
41U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
410U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
410U	PCB-1254 (AROCLOR 1254)
410U	PCB-1260 (AROCLOR 1260)
21	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD. ATHENS. GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-01

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1335 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y136

UG/KG	ANALYTICAL RESULTS
840U	PHENOL
840U	BIS(2-CHLOROETHYL) ETHER
840U	2-CHLOROPHENOL
840U	1,3-DICHLOROBENZENE
840U	1,4-DICHLOROBENZENE
840U	BENZYL ALCOHOL
840U	1,2-DICHLOROBENZENE
840U	2-METHYLPHENOL
840UR	BIS(2-CHLOROISOPROPYL) ETHER
840U	(3-AND/OR 4-)METHYLPHENOL
840U	N-NITROSODI-N-PROPYLAMINE
840U	HEXACHLOROETHANE
840UR	NITROBENZENE
840U	ISOPHORONE
840U	2-NITROPHENOL
840U	2,4-DIMETHYLPHENOL
4100U	BENZOIC ACID
840U	BIS(2-CHLOROETHOXY) METHANE
840U	2,4-DICHLOROPHENOL
840UR	1,2,4-TRICHLOROBENZENE
840U	NAPHTHALENE
840U	4-CHLOROANILINE
840U	HEXACHLOROBUTADIENE
840U	4-CHLORO-3-METHYLPHENOL
840U	2-METHYLNAPHTHALENE
840U	HEXACHLOROCYCLOPENTADIENE (HCCP)
840U	2,4,6-TRICHLOROPHENOL
4100U	2,4,5-TRICHLOROPHENOL
840UR	2-CHLORONAPHTHALENE
4100U	2-NITROANILINE
840U	DIMETHYL PHTHALATE
840U	ACENAPHTHYLENE
840U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
4100UR	3-NITROANILINE
840U	ACENAPHTHENE
4100U	2,4-DINITROPHENOL
4100U	4-NITROPHENOL
840U	DIBENZOFURAN
840U	2,4-DINITROTOLUENE
840U	DIETHYL PHTHALATE
840U	4-CHLOROPHENYL PHENYL ETHER
840U	FLUORENE
4100U	4-NITROANILINE
4100U	2-METHYL-4,6-DINITROPHENOL
840U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
840U	4-BROMOPHENYL PHENYL ETHER
840U	HEXACHLOROBENZENE (HCB)
4100U	PENTACHLOROPHENOL
580J	PHENANTHRENE
140J	ANTHRACENE
840U	DI-N-BUTYLPHTHALATE
1400	FLUORANTHENE
750J	PYRENE
840U	BENZYL BUTYL PHTHALATE
1700U	3,3'-DICHLOROBENZIDINE
330J	BENZO(A)ANTHRACENE
500J	CHRYSENE
840U	BIS(2-ETHYLHEXYL) PHTHALATE
840U	DI-N-OCTYLPHTHALATE
440J	BENZO(B AND/OR K)FLUORANTHENE
380J	BENZO-A-PYRENE
220J	INDENO (1,2,3-CD) PYRENE
840U	DIBENZO(A,H)ANTHRACENE
210J	BENZO(GHI)PERYLENE
21	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-01
CASE NO.: 15099 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1335 STOP: 00/00/00
D. NO.: Y136 MD NO: Y136

ANALYTICAL RESULTS UG/KG

2000J	2 UNIDENTIFIED COMPOUNDS
600JN	HEXADECANOIC ACID
300JN	ANTHRACENEDIONE
300JN	BENZOFLUORENE
200JN	BENZOFLUORANTHENE (NOT B OR K)
500JN	BENZACEPHENANTHRYLENE

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-01
CASE NO.: 15099 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1335 STOP: 00/00/00
D. NO.: Y136

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
13U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
13U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		21	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51678   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-02   COLLECTION START: 10/16/90 1420   STOP: 00/00/00
CASE.NO.: 15099   SAS NO.:   D. NO.: Y140   MD NO: Y140

ANALYTICAL RESULTS UG/KG

50000J	15 UNIDENTIFIED COMPOUNDS
N	PETROLEUM PRODUCT
1000JN	HEXADECANOIC ACID

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51678 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-02 COLLECTION START: 10/16/90 1420 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y140

UG/KG	ANALYTICAL RESULTS
50U	ALPHA-BHC
50U	BETA-BHC
50U	DELTA-BHC
50U	GAMMA-BHC (LINDANE)
50U	HEPTACHLOR
50U	ALDRIN
50U	HEPTACHLOR EPOXIDE
50U	ENDOSULFAN I (ALPHA)
100U	DIELDRIN
100U	4,4'-DDE (P,P'-DDE)
100U	ENDRIN
100U	ENDOSULFAN II (BETA)
100U	4,4'-DDD (P,P'-DDD)
100U	ENDOSULFAN SULFATE
100U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
500U	METHOXYCHLOR
100U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
500U	GAMMA-CHLORDANE /2
500U	ALPHA-CHLORDANE /2
1000U	TOXAPHENE
500U	PCB-1016 (AROCLOR 1016)
500U	PCB-1221 (AROCLOR 1221)
500U	PCB-1232 (AROCLOR 1232)
500U	PCB-1242 (AROCLOR 1242)
500U	PCB-1248 (AROCLOR 1248)
1000U	PCB-1254 (AROCLOR 1254)
1000U	PCB-1260 (AROCLOR 1260)
68	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51678 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-02

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1420 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y140

UG/KG	ANALYTICAL RESULTS
31U	CHLOROMETHANE
31U	BROMOMETHANE
31U	VINYL CHLORIDE
31U	CHLOROETHANE
16U	METHYLENE CHLORIDE
31U	ACETONE
10J	CARBON DISULFIDE
16U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
16U	1,1-DICHLOROETHANE
16U	1,2-DICHLOROETHENE (TOTAL)
16U	CHLOROFORM
16U	1,2-DICHLOROETHANE
31U	METHYL ETHYL KETONE
16U	1,1,1-TRICHLOROETHANE
16U	CARBON TETRACHLORIDE
31U	VINYL ACETATE
16U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
16U	1,2-DICHLOROPROPANE
16U	CIS-1,3-DICHLOROPROPENE
16U	TRICHLOROETHENE(TRICHLOROETHYLENE)
16U	DIBROMOCHLOROMETHANE
16U	1,1,2-TRICHLOROETHANE
16U	BENZENE
16U	TRANS-1,3-DICHLOROPROPENE
16U	BROMOFORM
31U	METHYL ISOBUTYL KETONE
31U	METHYL BUTYL KETONE
16U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
16U	1,1,2,2-TETRACHLOROETHANE
16U	TOLUENE
16U	CHLOROBENZENE
16U	ETHYL BENZENE
16U	STYRENE
16U	TOTAL XYLENES
68	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51678 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-02

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1420 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y140

UG/KG	ANALYTICAL RESULTS
2100U	PHENOL
2100U	BIS(2-CHLOROETHYL) ETHER
2100U	2-CHLOROPHENOL
2100U	1,3-DICHLOROBENZENE
2100U	1,4-DICHLOROBENZENE
2100U	BENZYL ALCOHOL
2100U	1,2-DICHLOROBENZENE
2100U	2-METHYLPHENOL
2100UR	BIS(2-CHLOROISOPROPYL) ETHER
2100U	(3-AND/OR 4-)METHYLPHENOL
2100U	N-NITROSODI-N-PROPYLAMINE
2100U	HEXACHLOROETHANE
2100UR	NITROBENZENE
2100U	ISOPHORONE
2100U	2-NITROPHENOL
2100U	2,4-DIMETHYLPHENOL
10000U	BENZOIC ACID
2100U	BIS(2-CHLOROETHOXY) METHANE
2100U	2,4-DICHLOROPHENOL
2100UR	1,2,4-TRICHLOROBENZENE
2100U	NAPHTHALENE
2100U	4-CHLOROANILINE
2100U	HEXACHLOROBUTADIENE
2100U	4-CHLORO-3-METHYLPHENOL
2100U	2-METHYLNAPHTHALENE
2100U	HEXACHLOROCYCLOPENTADIENE (HCCP)
2100U	2,4,6-TRICHLOROPHENOL
10000U	2,4,5-TRICHLOROPHENOL
2100UR	2-CHLORONAPHTHALENE
10000U	2-NITROANILINE
2100U	DIMETHYL PHTHALATE
2100U	ACENAPHTHYLENE
2100U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
10000UR	3-NITROANILINE
2100U	ACENAPHTHENE
10000U	2,4-DINITROPHENOL
10000U	4-NITROPHENOL
2100U	DIBENZOFURAN
2100U	2,4-DINITROTOLUENE
2100U	DIETHYL PHTHALATE
2100U	4-CHLOROPHENYL PHENYL ETHER
2100U	FLUORENE
10000U	4-NITROANILINE
10000U	2-METHYL-4,6-DINITROPHENOL
2100U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
2100U	4-BROMOPHENYL PHENYL ETHER
2100U	HEXACHLOROBENZENE (HCB)
10000U	PENTACHLOROPHENOL
2100U	PHENANTHRENE
2100U	ANTHRACENE
2100U	DI-N-BUTYLPHTHALATE
2100U	FLUORANTHENE
2100U	PYRENE
2100U	BENZYL BUTYL PHTHALATE
4100U	3,3'-DICHLOROBENZIDINE
2100U	BENZO(A)ANTHRACENE
2100U	CHRYSENE
2100U	BIS(2-ETHYLHEXYL) PHTHALATE
2100U	DI-N-OCTYLPHTHALATE
2100U	BENZO(B AND/OR K)FLUORANTHENE
2100U	BENZO-A-PYRENE
2100U	INDENO (1,2,3-CD) PYRENE
2100U	DIBENZO(A,H)ANTHRACENE
2100U	BENZO(GHI)PERYLENE
68	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51645 SAMPLE TYPE: PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: CITY: PALMETTO ST: FL
STATION ID: SD-04 COLLECTION START: 10/17/90 1630 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y166

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
13U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
13U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		20	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-05
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 1655 STOP: 00/00/00
D. NUMBER: Y168

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
21U	ALPHA-BHC	210U	METHOXYCHLOR
21U	BETA-BHC	43U	ENDRIN KETONE
21U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
21U	GAMMA-BHC (LINDANE)	210U	GAMMA-CHLORDANE /2
30U	HEPTACHLOR	210U	ALPHA-CHLORDANE /2
21U	ALDRIN	430U	TOXAPHENE
21U	HEPTACHLOR EPOXIDE	210U	PCB-1016 (AROCLOR 1016)
21U	ENDOSULFAN I (ALPHA)	210U	PCB-1221 (AROCLOR 1221)
43U	DIELDRIN	210U	PCB-1232 (AROCLOR 1232)
43U	4,4'-DDE (P,P'-DDE)	210U	PCB-1242 (AROCLOR 1242)
43U	ENDRIN	210U	PCB-1248 (AROCLOR 1248)
43U	ENDOSULFAN II (BETA)	430U	PCB-1254 (AROCLOR 1254)
43U	4,4' DDD (P,P'-DDD)	430U	PCB 1260 (AROCLOR 1260)
43U	ENDOSULFAN SULFATE	25	PERCENT MOISTURE
43U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-05
COLLECTION START: 10/15/90 1655 STOP: 00/00/00
CASE NO.: 15099 SAS NO.:
D. NO.: Y168 MD NO: Y168

ANALYTICAL RESULTS UG/KG

3000J 3 UNIDENTIFIED COMPOUNDS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-05 COLLECTION START: 10/15/90 1655 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y168

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
880U	PHENOL	4300UR	3-NITROANILINE
880U	BIS(2-CHLOROETHYL) ETHER	880UR	ACENAPHTHENE
880U	2-CHLOROPHENOL	4300U	2,4-DINITROPHENOL
880U	1,3-DICHLOROBENZENE	4300U	4-NITROPHENOL
880U	1,4-DICHLOROBENZENE	880U	DIBENZOFURAN
880U	BENZYL ALCOHOL	880U	2,4-DINITROTOLUENE
880U	1,2-DICHLOROBENZENE	880U	DIETHYL PHTHALATE
880U	2-METHYLPHENOL	880U	4-CHLOROPHENYL PHENYL ETHER
880UR	BIS(2-CHLOROISOPROPYL) ETHER	880U	FLUORENE
880U	(3-AND/OR 4-)METHYLPHENOL	4300U	4-NITROANILINE
880U	N-NITROSODI-N-PROPYLAMINE	4300U	2-METHYL-4,6-DINITROPHENOL
880U	HEXACHLOROETHANE	880U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
880UR	NITROBENZENE	880U	4 BROMOPHENYL PHENYL ETHER
880U	ISOPHORONE	880U	HEXACHLOROBENZENE (HCB)
880U	2-NITROPHENOL	4300U	PENTACHLOROPHENOL
880U	2,4-DIMETHYLPHENOL	750J	PHENANTHRENE
4300U	BENZOIC ACID	880U	ANTHRACENE
880U	BIS(2-CHLOROETHOXY) METHANE	880U	DI-N-BUTYLPHTHALATE
880U	2,4-DICHLOROPHENOL	1300	FLUORANTHENE
880UR	1,2,4-TRICHLOROBENZENE	720J	PYRENE
880U	NAPHTHALENE	880U	BENZYL BUTYL PHTHALATE
880U	4-CHLOROANILINE	1800U	3,3'-DICHLOROBENZIDINE
880U	HEXACHLOROBUTADIENE	120J	BENZO(A)ANTHRACENE
880U	4-CHLORO-3-METHYLPHENOL	420J	CHRYSENE
880U	2-METHYLNAPHTHALENE	880U	BIS(2-ETHYLHEXYL) PHTHALATE
880U	HEXACHLOROCYCLOPENTADIENE (HCCP)	880U	DI-N-OCTYLPHTHALATE
880U	2,4,6-TRICHLOROPHENOL	270J	BENZO(B AND/OR K)FLUORANTHENE
4300U	2,4,5-TRICHLOROPHENOL	210J	BENZO-A-PYRENE
880UR	2-CHLORONAPHTHALENE	880U	INDENO (1,2,3-CD) PYRENE
4300U	2-NITROANILINE	880U	DIBENZO(A,H)ANTHRACENE
880U	DIMETHYL PHTHALATE	880U	BENZO(GHI)PERYLENE
880U	ACENAPHTHYLENE	25	PERCENT MOISTURE
880U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-05

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 1655 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y168

UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE
13U	BROMOMETHANE
13U	VINYL CHLORIDE
13U	CHLOROETHANE
7U	METHYLENE CHLORIDE
13U	ACETONE
7U	CARBON DISULFIDE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
7U	1,1-DICHLOROETHANE
7U	1,2-DICHLOROETHENE (TOTAL)
7U	CHLOROFORM
7U	1,2-DICHLOROETHANE
13U	METHYL ETHYL KETONE
7U	1,1,1-TRICHLOROETHANE
7U	CARBON TETRACHLORIDE
13U	VINYL ACETATE
7U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
7U	1,2-DICHLOROPROPANE
7U	CIS-1,3-DICHLOROPROPENE
7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
7U	DIBROMOCHLOROMETHANE
7U	1,1,2-TRICHLOROETHANE
7U	BENZENE
7U	TRANS-1,3-DICHLOROPROPENE
7U	BROMOFORM
13U	METHYL ISOBUTYL KETONE
13U	METHYL BUTYL KETONE
7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,1,2,2-TETRACHLOROETHANE
7U	TOLUENE
7U	CHLOROBENZENE
7U	ETHYL BENZENE
7U	STYRENE
7U	TOTAL XYLENES
25	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025	SAMPLE NO. 51645	SAMPLE TYPE:	PROG ELEM: NSF	COLLECTED BY: M GORDON
SOURCE:			CITY: PALMETTO	ST: FL
STATION ID: SD-04			COLLECTION START: 10/17/90 1630	STOP: 00/00/00
CASE.NO.: 15099	SAS NO.:		D. NO.: Y166	MD NO: Y166

ANALYTICAL RESULTS UG/KG

2000J 1 UNIDENTIFIED COMPOUND

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51645 SAMPLE TYPE:
SOURCE:
STATION ID: SD-04
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1630 STOP: 00/00/00
D. NUMBER: Y166

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC	200U	METHOXYCHLOR
20U	BETA-BHC	40U	ENDRIN KETONE
20U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
20U	GAMMA-BHC (LINDANE)	200U	GAMMA-CHLORDANE /2
20U	HEPTACHLOR	200U	ALPHA-CHLORDANE /2
20U	ALDRIN	400U	TOXAPHENE
20U	HEPTACHLOR EPOXIDE	200U	PCB-1016 (AROCLOR 1016)
20U	ENDOSULFAN I (ALPHA)	200U	PCB-1221 (AROCLOR 1221)
40U	DIELDRIN	200U	PCB-1232 (AROCLOR 1232)
40U	4,4'-DDE (P,P'-DDE)	200U	PCB-1242 (AROCLOR 1242)
40U	ENDRIN	200U	PCB-1248 (AROCLOR 1248)
40U	ENDOSULFAN II (BETA)	400U	PCB-1254 (AROCLOR 1254)
40U	4,4' DDD (P,P' DDD)	400U	PCB 1260 (AROCLOR 1260)
40U	ENDOSULFAN SULFATE	19	PERCENT MOISTURE
40U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51645 SAMPLE TYPE: PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: CITY: PALMETTO ST: FL
STATION ID: SD-04 COLLECTION START: 10/17/90 1630 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y166

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
810U	PHENOL	4000UR	3-NITROANILINE
810U	BIS(2-CHLOROETHYL) ETHER	810UR	ACENAPHTHENE
810U	2-CHLOROPHENOL	4000U	2,4-DINITROPHENOL
810U	1,3-DICHLOROBENZENE	4000U	4-NITROPHENOL
810U	1,4-DICHLOROBENZENE	810U	DIBENZOFURAN
810U	BENZYL ALCOHOL	810U	2,4-DINITROTOLUENE
810U	1,2-DICHLOROBENZENE	810U	DIETHYL PHTHALATE
810U	2-METHYLPHENOL	810U	4-CHLOROPHENYL PHENYL ETHER
810UR	BIS(2-CHLOROISOPROPYL) ETHER	810U	FLUORENE
810U	(3-AND/OR 4-)METHYLPHENOL	4000U	4-NITROANILINE
810U	N-NITROSODI-N-PROPYLAMINE	4000U	2-METHYL-4,6-DINITROPHENOL
810U	HEXACHLOROETHANE	810U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
810UR	NITROBENZENE	810U	4 BROMOPHENYL PHENYL ETHER
810U	ISOPHORONE	810U	HEXACHLOROBENZENE (HCB)
810U	2-NITROPHENOL	4000U	PENTACHLOROPHENOL
810U	2,4-DIMETHYLPHENOL	810U	PHENANTHRENE
4000U	BENZOIC ACID	810U	ANTHRACENE
810U	BIS(2-CHLOROETHOXY) METHANE	810U	DI-N-BUTYLPHTHALATE
810U	2,4-DICHLOROPHENOL	810U	FLUORANTHENE
810UR	1,2,4-TRICHLOROBENZENE	810U	PYRENE
810U	NAPHTHALENE	810U	BENZYL BUTYL PHTHALATE
810U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
810U	HEXACHLOROBUTADIENE	810U	BENZO(A)ANTHRACENE
810U	4-CHLORO-3-METHYLPHENOL	810U	CHRYSENE
810U	2-METHYLNAPHTHALENE	810U	BIS(2-ETHYLHEXYL) PHTHALATE
810U	HEXACHLOROCYCLOPENTADIENE (HCCP)	810U	DI-N-OCTYLPHTHALATE
810U	2,4,6-TRICHLOROPHENOL	810U	BENZO(B AND/OR K)FLUORANTHENE
4000U	2,4,5-TRICHLOROPHENOL	810U	BENZO-A-PYRENE
810UR	2-CHLORONAPHTHALENE	810U	INDENO (1,2,3-CD) PYRENE
4000U	2-NITROANILINE	810U	DIBENZO(A,H)ANTHRACENE
810U	DIMETHYL PHTHALATE	810U	BENZO(GHI)PERYLENE
810U	ACENAPHTHYLENE	19	PERCENT MOISTURE
810U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51655   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-06   COLLECTION START: 10/17/90 1445   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y156

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
800U	PHENOL	3900UR	3-NITROANILINE
800U	BIS(2-CHLOROETHYL) ETHER	800UR	ACENAPHTHENE
800U	2-CHLOROPHENOL	3900U	2,4-DINITROPHENOL
800U	1,3-DICHLOROBENZENE	3900U	4-NITROPHENOL
800U	1,4-DICHLOROBENZENE	800U	DIBENZOFURAN
800U	BENZYL ALCOHOL	800U	2,4-DINITROTOLUENE
800U	1,2-DICHLOROBENZENE	800U	DIETHYL PHTHALATE
800U	2-METHYLPHENOL	800U	4-CHLOROPHENYL PHENYL ETHER
800UR	BIS(2-CHLOROISOPROPYL) ETHER	800U	FLUORENE
800U	(3-AND/OR 4-)METHYLPHENOL	3900U	4-NITROANILINE
800U	N-NITROSODI-N-PROPYLAMINE	3900U	2-METHYL-4,6-DINITROPHENOL
800U	HEXACHLOROETHANE	800U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
800UR	NITROBENZENE	800U	4 BROMOPHENYL PHENYL ETHER
800U	ISOPHORONE	800U	HEXACHLOROBENZENE (HCB)
800U	2-NITROPHENOL	3900U	PENTACHLOROPHENOL
800U	2,4-DIMETHYLPHENOL	800U	PHENANTHRENE
3900U	BENZOIC ACID	800U	ANTHRACENE
800U	BIS(2-CHLOROETHOXY) METHANE	800U	DI-N-BUTYLPHTHALATE
800U	2,4-DICHLOROPHENOL	800U	FLUORANTHENE
800UR	1,2,4-TRICHLOROBENZENE	800U	PYRENE
800U	NAPHTHALENE	800U	BENZYL BUTYL PHTHALATE
800U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
800U	HEXACHLOROBUTADIENE	800U	BENZO(A)ANTHRACENE
800U	4-CHLORO-3-METHYLPHENOL	800U	CHRYSENE
800U	2-METHYLNAPHTHALENE	800U	BIS(2-ETHYLHEXYL) PHTHALATE
800U	HEXACHLOROCYCLOPENTADIENE (HCCP)	800U	DI-N-OCTYLPHTHALATE
800U	2,4,6-TRICHLOROPHENOL	800U	BENZO(B AND/OR K)FLUORANTHENE
3900U	2,4,5-TRICHLOROPHENOL	800U	BENZO-A-PYRENE
800UR	2-CHLORONAPHTHALENE	800U	INDENO (1,2,3-CD) PYRENE
3900U	2-NITROANILINE	800U	DIBENZO(A,H)ANTHRACENE
800U	DIMETHYL PHTHALATE	800U	BENZO(GHI)PERYLENE
800U	ACENAPHTHYLENE	18	PERCENT MOISTURE
800U	2,6-DINITROTOLUENE		

REMARKS   ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-07
CASE NO.: 15099 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1520 STOP: 00/00/00
D. NO.: Y160 MD NO: Y160

ANALYTICAL RESULTS UG/KG

20J	1 UNIDENTIFIED COMPOUND
30JN	TRIMETHYLBICYCLOHEPTANE
200JN	METHYL(METHYLETHYL)BENZENE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51655 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-06 COLLECTION START: 10/17/90 1445 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y156

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
26	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		18	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PESTICIDES/PCB'S DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51655 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-06
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1445 STOP: 00/00/00
D. NUMBER: Y156

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
39U	DIELDRIN
39U	4,4'-DDE (P,P'-DDE)
39U	ENDRIN
39U	ENDOSULFAN II (BETA)
39U	4,4'-DDD (P,P'-DDD)
39U	ENDOSULFAN SULFATE
39U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
39U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
390U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
390U	PCB-1254 (AROCLOR 1254)
390U	PCB 1260 (AROCLOR 1260)
18	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PESTICIDES/PCB'S DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-07
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1520 STOP: 00/00/00
D. NUMBER: Y160

UG/KG	ANALYTICAL RESULTS
21U	ALPHA-BHC
21U	BETA-BHC
21U	DELTA-BHC
21U	GAMMA-BHC (LINDANE)
40U	HEPTACHLOR
21U	ALDRIN
21U	HEPTACHLOR EPOXIDE
21U	ENDOSULFAN I (ALPHA)
43U	DIELDRIN
43U	4,4'-DDE (P,P'-DDE)
43U	ENDRIN
43U	ENDOSULFAN II (BETA)
43U	4,4' DDD (P,P' DDD)
43U	ENDOSULFAN SULFATE
43U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
210U	METHOXYCHLOR
43U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
210U	GAMMA-CHLORDANE /2
210U	ALPHA-CHLORDANE /2
430U	TOXAPHENE
210U	PCB-1016 (AROCLOR 1016)
210U	PCB-1221 (AROCLOR 1221)
210U	PCB-1232 (AROCLOR 1232)
210U	PCB-1242 (AROCLOR 1242)
210U	PCB-1248 (AROCLOR 1248)
430U	PCB-1254 (AROCLOR 1254)
430U	PCB 1260 (AROCLOR 1260)
25	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-07 COLLECTION START: 10/17/90 1520 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y160 MD NO: Y160

ANALYTICAL RESULTS UG/KG

N	PETROLEUM PRODUCT
2000JN	TETRAHYDRODIMETHYL(METHYLETHYL)NAPHTHALENE
	DECAHYDROMETHYLMETHYLENE(METHYLETHYL)-
1000JN	NAPHTHALENOL
500JN	HEXADECANOIC ACID
300JN	BENZOFLUORENE
20000J	5 UNIDENTIFIED COMPOUNDS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-07 COLLECTION START: 10/17/90 1520 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y160

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
880U	PHENOL	4300UR	3-NITROANILINE
880U	BIS(2-CHLOROETHYL) ETHER	140J	ACENAPHTHENE
880U	2-CHLOROPHENOL	4300U	2,4-DINITROPHENOL
880U	1,3-DICHLOROBENZENE	4300U	4-NITROPHENOL
880U	1,4-DICHLOROBENZENE	880U	DIBENZOFURAN
880U	BENZYL ALCOHOL	880U	2,4-DINITROTOLUENE
880U	1,2-DICHLOROBENZENE	880U	DIETHYL PHTHALATE
880U	2-METHYLPHENOL	880U	4-CHLOROPHENYL PHENYL ETHER
880UR	BIS(2-CHLOROISOPROPYL) ETHER	880U	FLUORENE
880U	(3-AND/OR 4-)METHYLPHENOL	4300U	4-NITROANILINE
880U	N-NITROSODI-N-PROPYLAMINE	4300U	2-METHYL-4,6-DINITROPHENOL
880U	HEXACHLOROETHANE	880U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
880UR	NITROBENZENE	880U	4 BROMOPHENYL PHENYL ETHER
880U	ISOPHORONE	880U	HEXACHLOROBENZENE (HCB)
880U	2-NITROPHENOL	4300U	PENTACHLOROPHENOL
880U	2,4-DIMETHYLPHENOL	760J	PHENANTHRENE
4300U	BENZOIC ACID	190J	ANTHRACENE
880U	BIS(2-CHLOROETHOXY) METHANE	880U	DI-N-BUTYLPHTHALATE
880U	2,4-DICHLOROPHENOL	3200	FLUORANTHENE
880UR	1,2,4-TRICHLOROBENZENE	1600	PYRENE
880U	NAPHTHALENE	880U	BENZYL BUTYL PHTHALATE
880U	4-CHLOROANILINE	1800U	3,3'-DICHLOROBENZIDINE
880U	HEXACHLOROBUTADIENE	490J	BENZO(A)ANTHRACENE
880U	4-CHLORO-3-METHYLPHENOL	710J	CHRYSENE
880U	2-METHYLNAPHTHALENE	880U	BIS(2-ETHYLHEXYL) PHTHALATE
880U	HEXACHLOROCYCLOPENTADIENE (HCCP)	880U	DI-N-OCTYLPHTHALATE
880U	2,4,6-TRICHLOROPHENOL	470J	BENZO(B AND/OR K)FLUORANTHENE
4300U	2,4,5-TRICHLOROPHENOL	350J	BENZO-A-PYRENE
880UR	2-CHLORONAPHTHALENE	140J	INDENO (1,2,3-CD) PYRENE
4300U	2-NITROANILINE	880U	DIBENZO(A,H)ANTHRACENE
880U	DIMETHYL PHTHALATE	880U	BENZO(GHI)PERYLENE
880U	ACENAPHTHYLENE	25	PERCENT MOISTURE
880U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-07

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1520 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y160

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
30U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	7U	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
13U	VINYL ACETATE	7U	STYRENE
7U	BROMODICHLOROMETHANE	7U	TOTAL XYLENES
		25	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51648 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-08 COLLECTION START: 10/17/90 1610 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y164

UG/KG	ANALYTICAL RESULTS
24U	ALPHA-BHC
24U	BETA-BHC
24U	DELTA-BHC
24U	GAMMA-BHC (LINDANE)
40U	HEPTACHLOR
24U	ALDRIN
24U	HEPTACHLOR EPOXIDE
24U	ENDOSULFAN I (ALPHA)
47U	DIELDRIN
47U	4,4'-DDE (P,P'-DDE)
47U	ENDRIN
47U	ENDOSULFAN II (BETA)
47U	4,4'-DDD (P,P'-DDD)
47U	ENDOSULFAN SULFATE
47U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
240U	METHOXYCHLOR
47U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
240U	GAMMA-CHLORDANE /2
240U	ALPHA-CHLORDANE /2
470U	TOXAPHENE
240U	PCB-1016 (AROCLOR 1016)
240U	PCB-1221 (AROCLOR 1221)
240U	PCB-1232 (AROCLOR 1232)
240U	PCB-1242 (AROCLOR 1242)
350	PCB-1248 (AROCLOR 1248)
470U	PCB-1254 (AROCLOR 1254)
470U	PCB-1260 (AROCLOR 1260)
32	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51648 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SD-08	COLLECTION START: 10/17/90 1610 STOP: 00/00/00
CASE NO.: 15099 SAS NO.:	D. NO.: Y164 MD NO: Y164

ANALYTICAL RESULTS UG/KG

500JN	TETRAHYDRODIMETHYL(METHYLETHYL)NAPHTHALENE
20000J	7 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51648 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-08

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1610 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y164

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
970U	PHENOL	4700UR	3-NITROANILINE
970U	BIS(2-CHLOROETHYL) ETHER	970UR	ACENAPHTHENE
970U	2-CHLOROPHENOL	4700U	2,4-DINITROPHENOL
970U	1,3-DICHLOROBENZENE	4700U	4-NITROPHENOL
970U	1,4-DICHLOROBENZENE	970U	DIBENZOFURAN
970U	BENZYL ALCOHOL	970U	2,4-DINITROTOLUENE
970U	1,2-DICHLOROBENZENE	970U	DIETHYL PHTHALATE
970U	2-METHYLPHENOL	970U	4-CHLOROPHENYL PHENYL ETHER
970UR	BIS(2-CHLOROISOPROPYL) ETHER	970U	FLUORENE
970U	(3-AND/OR 4-)METHYLPHENOL	4700U	4-NITROANILINE
970U	N-NITROSODI-N-PROPYLAMINE	4700U	2-METHYL-4,6-DINITROPHENOL
970U	HEXACHLOROETHANE	970U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
970UR	NITROBENZENE	970U	4-BROMOPHENYL PHENYL ETHER
970U	ISOPHORONE	970U	HEXACHLOROBENZENE (HCB)
970U	2-NITROPHENOL	4700U	PENTACHLOROPHENOL
970U	2,4-DIMETHYLPHENOL	970U	PHENANTHRENE
4700U	BENZOIC ACID	970U	ANTHRACENE
970U	BIS(2-CHLOROETHOXY) METHANE	970U	DI-N-BUTYLPHTHALATE
970U	2,4-DICHLOROPHENOL	970U	FLUORANTHENE
970UR	1,2,4-TRICHLOROBENZENE	970U	PYRENE
970U	NAPHTHALENE	210J	BENZYL BUTYL PHTHALATE
970U	4-CHLOROANILINE	1900U	3,3'-DICHLOROBENZIDINE
970U	HEXACHLOROBUTADIENE	970U	BENZO(A)ANTHRACENE
970U	4-CHLORO-3-METHYLPHENOL	970U	CHRYSENE
970U	2-METHYLNAPHTHALENE	970U	BIS(2-ETHYLHEXYL) PHTHALATE
970U	HEXACHLOROCYCLOPENTADIENE (HCCP)	970U	DI-N-OCTYLPHTHALATE
970U	2,4,6-TRICHLOROPHENOL	970U	BENZO(B AND/OR K)FLUORANTHENE
4700U	2,4,5-TRICHLOROPHENOL	970U	BENZO-A-PYRENE
970UR	2-CHLORONAPHTHALENE	970U	INDENO (1,2,3-CD) PYRENE
4700U	2-NITROANILINE	970U	DIBENZO(A,H)ANTHRACENE
970U	DIMETHYL PHTHALATE	970U	BENZO(GHI)PERYLENE
970U	ACENAPHTHYLENE	32	PERCENT MOISTURE
970U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51648   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-08   COLLECTION START: 10/17/90 1610   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y164

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
15U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
15U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
15U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
15U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
15U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	15U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	15U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
15U	METHYL ETHYL KETONE	7U	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
15U	VINYL ACETATE	7U	STYRENE
7U	BROMODICHLOROMETHANE	7U	TOTAL XYLENES
		32	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-09
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1530 STOP: 00/00/00
D. NUMBER: Y162

UG/KG	ANALYTICAL RESULTS
27U	ALPHA-BHC
27U	BETA-BHC
27U	DELTA-BHC
27U	GAMMA-BHC (LINDANE)
50U	HEPTACHLOR
27U	ALDRIN
27U	HEPTACHLOR EPOXIDE
27U	ENDOSULFAN I (ALPHA)
53U	DIELDRIN
53U	4,4'-DDE (P,P'-DDE)
53U	ENDRIN
53U	ENDOSULFAN II (BETA)
53U	4,4'-DDD (P,P'-DDD)
53U	ENDOSULFAN SULFATE
53U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
270U	METHOXYCHLOR
53U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
270U	GAMMA-CHLORDANE /2
270U	ALPHA-CHLORDANE /2
530U	TOXAPHENE
270U	PCB-1016 (AROCLOR 1016)
270U	PCB-1221 (AROCLOR 1221)
270U	PCB-1232 (AROCLOR 1232)
270U	PCB-1242 (AROCLOR 1242)
270U	PCB-1248 (AROCLOR 1248)
530U	PCB-1254 (AROCLOR 1254)
530U	PCB 1260 (AROCLOR 1260)
40	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51652  SAMPLE TYPE: SOIL       PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO              ST: FL                **
**   STATION ID: SD-09                                               COLLECTION START: 10/17/90  1530   STOP: 00/00/00 **
**   CASE NO.: 15099         SAS NO.:                                D. NO.: Y162               MD NO: Y162           **
**                                                                                                                     **
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ANALYTICAL RESULTS UG/KG

5000J	2 UNIDENTIFIED COMPOUNDS
1000JN	DODECANOIC ACID
400JN	HEPTADECANOIC ACID
800JN	OCTADECANOIC ACID

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-09

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1530 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y162

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
1100U	PHENOL	5300UR	3-NITROANILINE
1100U	BIS(2-CHLOROETHYL) ETHER	110UR	ACENAPHTHENE
1100U	2-CHLOROPHENOL	5300U	2,4-DINITROPHENOL
1100U	1,3-DICHLOROBENZENE	5300U	4-NITROPHENOL
1100U	1,4-DICHLOROBENZENE	1100U	DIBENZOFURAN
1100U	BENZYL ALCOHOL	1100U	2,4-DINITROTOLUENE
1100U	1,2-DICHLOROBENZENE	1100U	DIETHYL PHTHALATE
1100U	2-METHYLPHENOL	1100U	4-CHLOROPHENYL PHENYL ETHER
1100UR	BIS(2-CHLOROISOPROPYL) ETHER	1100U	FLUORENE
1100U	(3-AND/OR 4-)METHYLPHENOL	5300U	4-NITROANILINE
1100U	N-NITROSODI-N-PROPYLAMINE	5300U	2-METHYL-4,6-DINITROPHENOL
1100U	HEXACHLOROETHANE	1100U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
1100UR	NITROBENZENE	1100U	4-BROMOPHENYL PHENYL ETHER
1100U	ISOPHORONE	1100U	HEXACHLOROBENZENE (HCB)
1100U	2-NITROPHENOL	5300U	PENTACHLOROPHENOL
1100U	2,4-DIMETHYLPHENOL	1100U	PHENANTHRENE
5300U	BENZOIC ACID	1100U	ANTHRACENE
1100U	BIS(2-CHLOROETHOXY) METHANE	1100U	DI-N-BUTYLPHTHALATE
1100U	2,4-DICHLOROPHENOL	1100U	FLUORANTHENE
1100UR	1,2,4-TRICHLOROBENZENE	1100U	PYRENE
1100U	NAPHTHALENE	1100U	BENZYL BUTYL PHTHALATE
1100U	4-CHLOROANILINE	2200U	3,3'-DICHLOROBENZIDINE
1100U	HEXACHLOROBUTADIENE	1100U	BENZO(A)ANTHRACENE
1100U	4-CHLORO-3-METHYLPHENOL	1100U	CHRYSENE
1100U	2-METHYLNAPHTHALENE	1100U	BIS(2-ETHYLHEXYL) PHTHALATE
1100U	HEXACHLOROCYCLOPENTADIENE (HCCP)	1100U	DI-N-OCTYLPHTHALATE
1100U	2,4,6-TRICHLOROPHENOL	1100U	BENZO(B AND/OR K)FLUORANTHENE
5300U	2,4,5-TRICHLOROPHENOL	1100U	BENZO-A-PYRENE
1100UR	2-CHLORONAPHTHALENE	1100U	INDENO (1,2,3-CD) PYRENE
5300U	2-NITROANILINE	1100U	DIBENZO(A,H)ANTHRACENE
1100U	DIMETHYL PHTHALATE	1100U	BENZO(GHI)PERYLENE
1100U	ACENAPHTHYLENE	40	PERCENT MOISTURE
1100U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-09 COLLECTION START: 10/17/90 1530 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y162

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
17U	CHLOROMETHANE	8U	1,2-DICHLOROPROPANE
17U	BROMOMETHANE	8U	CIS-1,3-DICHLOROPROPENE
17U	VINYL CHLORIDE	8U	TRICHLOROETHENE(TRICHLOROETHYLENE)
17U	CHLOROETHANE	8U	DIBROMOCHLOROMETHANE
9U	METHYLENE CHLORIDE	8U	1,1,2-TRICHLOROETHANE
37	ACETONE	8U	BENZENE
8U	CARBON DISULFIDE	8U	TRANS-1,3-DICHLOROPROPENE
8U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	8U	BROMOFORM
8U	1,1-DICHLOROETHANE	17U	METHYL ISOBUTYL KETONE
8U	1,2-DICHLOROETHENE (TOTAL)	17U	METHYL BUTYL KETONE
8U	CHLOROFORM	8U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
8U	1,2-DICHLOROETHANE	8U	1,1,2,2-TETRACHLOROETHANE
17U	METHYL ETHYL KETONE	8U	TOLUENE
8U	1,1,1-TRICHLOROETHANE	8U	CHLOROBENZENE
8U	CARBON TETRACHLORIDE	8U	ETHYL BENZENE
17U	VINYL ACETATE	8U	STYRENE
8U	BROMODICHLOROMETHANE	8U	TOTAL XYLENES
		40	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-10
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1045 STOP: 00/00/00
D. NUMBER: Y150

UG/KG	ANALYTICAL RESULTS
30U	ALPHA-BHC
30U	BETA-BHC
30U	DELTA-BHC
30U	GAMMA-BHC (LINDANE)
30U	HEPTACHLOR
30U	ALDRIN
30U	HEPTACHLOR EPOXIDE
30U	ENDOSULFAN I (ALPHA)
59U	DIELDRIN
59U	4,4'-DDE (P,P'-DDE)
59U	ENDRIN
59U	ENDOSULFAN II (BETA)
59U	4,4'-DDD (P,P' DDD)
59U	ENDOSULFAN SULFATE
59U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
300U	METHOXYCHLOR
59U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
300U	GAMMA-CHLORDANE /2
300U	ALPHA-CHLORDANE /2
590U	TOXAPHENE
300U	PCB-1016 (AROCLOR 1016)
300U	PCB-1221 (AROCLOR 1221)
300U	PCB-1232 (AROCLOR 1232)
300U	PCB-1242 (AROCLOR 1242)
300U	PCB-1248 (AROCLOR 1248)
590U	PCB-1254 (AROCLOR 1254)
590U	PCB 1260 (AROCLOR 1260)
46	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-10
CASE NO.: 15099 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1045 STOP: 00/00/00
D. NO.: Y150 MD NO: Y150

ANALYTICAL RESULTS UG/KG

30000J	4 UNIDENTIFIED COMPOUNDS
3000JN	PHENYLETHANONE
20000JN	DODECANOIC ACID
700JN	TETRADECANOIC ACID
20000JN	HEXADECANOIC ACID
2000JN	PHENYLTRICYCLONONADIENOL
6000JN	DIPHENYLPROPANEDIONE
4000JN	OCTADECANOIC ACID

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-10
CASE NO.: 15099
SAS NO.:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1045 STOP: 00/00/00
D. NO.: Y150

UG/KG	ANALYTICAL RESULTS
10000	PHENOL
1200U	BIS(2-CHLOROETHYL) ETHER
1200U	2-CHLOROPHENOL
1200U	1,3-DICHLOROBENZENE
1200U	1,4-DICHLOROBENZENE
1200U	BENZYL ALCOHOL
1200U	1,2-DICHLOROBENZENE
1200U	2-METHYLPHENOL
1200UR	BIS(2-CHLOROISOPROPYL) ETHER
1200U	(3-AND/OR 4-)METHYLPHENOL
1200U	N-NITROSODI-N-PROPYLAMINE
1200U	HEXACHLOROETHANE
1200UR	NITROBENZENE
1200U	ISOPHORONE
1200U	2-NITROPHENOL
1200U	2,4-DIMETHYLPHENOL
690J	BENZOIC ACID
1200U	BIS(2-CHLOROETHOXY) METHANE
1200U	2,4-DICHLOROPHENOL
1200UR	1,2,4-TRICHLOROBENZENE
1200U	NAPHTHALENE
1200U	4-CHLOROANILINE
1200U	HEXACHLOROBUTADIENE
1200U	4-CHLORO-3-METHYLPHENOL
1200U	2-METHYLNAPHTHALENE
1200U	HEXACHLOROCYCLOPENTADIENE (HCCP)
1200U	2,4,6-TRICHLOROPHENOL
5900U	2,4,5-TRICHLOROPHENOL
1200UR	2-CHLORONAPHTHALENE
5900U	2-NITROANILINE
1200U	DIMETHYL PHTHALATE
1200U	ACENAPHTHYLENE
1200U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
5900UR	3-NITROANILINE
1200U	ACENAPHTHENE
5900U	2,4-DINITROPHENOL
5900U	4-NITROPHENOL
1200U	DIBENZOFURAN
1200U	2,4-DINITROTOLUENE
1200U	DIETHYL PHTHALATE
1200U	4-CHLOROPHENYL PHENYL ETHER
1200U	FLUORENE
5900U	4-NITROANILINE
5900U	2-METHYL-4,6-DINITROPHENOL
1200U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
1200U	4-BROMOPHENYL PHENYL ETHER
1200U	HEXACHLOROBENZENE (HCB)
5900U	PENTACHLOROPHENOL
1200U	PHENANTHRENE
1200U	ANTHRACENE
1200U	DI-N-BUTYLPHTHALATE
1200U	FLUORANTHENE
1200U	PYRENE
1200U	BENZYL BUTYL PHTHALATE
2400U	3,3'-DICHLOROBENZIDINE
1200U	BENZO(A)ANTHRACENE
1200U	CHRYSENE
1200U	BIS(2-ETHYLHEXYL) PHTHALATE
1200U	DI-N-OCTYLPHTHALATE
1200U	BENZO(B AND/OR K)FLUORANTHENE
1200U	BENZO-A-PYRENE
1200U	INDENO (1,2,3-CD) PYRENE
1200U	DIBENZO(A,H)ANTHRACENE
1200U	BENZO(GHI)PERYLENE
46	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

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*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-10 COLLECTION START: 10/17/90 1045 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y150

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
19U	CHLOROMETHANE	9U	1,2-DICHLOROPROPANE
19U	BROMOMETHANE	9U	CIS-1,3-DICHLOROPROPENE
19U	VINYL CHLORIDE	9U	TRICHLOROETHENE(TRICHLOROETHYLENE)
19U	CHLOROETHANE	9U	DIBROMOCHLOROMETHANE
9U	METHYLENE CHLORIDE	9U	1,1,2-TRICHLOROETHANE
30U	ACETONE	9U	BENZENE
9U	CARBON DISULFIDE	9U	TRANS-1,3-DICHLOROPROPENE
9U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	9U	BROMOFORM
9U	1,1-DICHLOROETHANE	19U	METHYL ISOBUTYL KETONE
9U	1,2-DICHLOROETHENE (TOTAL)	19U	METHYL BUTYL KETONE
9U	CHLOROFORM	9U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
9U	1,2-DICHLOROETHANE	9U	1,1,2,2-TETRACHLOROETHANE
19U	METHYL ETHYL KETONE	9U	TOLUENE
9U	1,1,1-TRICHLOROETHANE	9U	CHLOROBENZENE
9U	CARBON TETRACHLORIDE	9U	ETHYL BENZENE
19U	VINYL ACETATE	9U	STYRENE
9U	BROMODICHLOROMETHANE	9U	TOTAL XYLENES
		47	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51649   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-11   COLLECTION START: 10/17/90 1505   STOP: 00/00/00
CASE NO.: 15099   SAS NO.:   D. NO.: Y159   MD NO: Y159

ANALYTICAL RESULTS UG/KG

50000J	17 UNIDENTIFIED COMPOUNDS
N	PETROLEUM PRODUCT

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51672 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-03 COLLECTION START: 10/17/90 1145 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y151 MD NO: Y151

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51662 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-04 COLLECTION START: 10/18/90 1040 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y175 MD NO: Y175

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51664 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-05 COLLECTION START: 10/18/90 0930 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y172 MD NO: Y172

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51673  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO                ST: FL                  **
**   STATION ID: MW-01                                                COLLECTION START: 10/16/90  1130   STOP: 00/00/00     **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y326                  MD NO: Y326             **
**                                                                                                                          **
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RESULTS	UNITS	PARAMETER
10UJ	UG/L	CYANIDE

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51687  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON            **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO               ST: FL                **
**   STATION ID: MW-03                                               COLLECTION START: 10/17/90  0900   STOP: 00/00/00  **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y328                MD NO: Y328            **
**                                                                                                                      **
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RESULTS	UNITS	PARAMETER
10UJ	UG/L	CYANIDE

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51679  SAMPLE TYPE: GROUNDWA     PROG ELEM: NSF   COLLECTED BY: M GORDON            **
**   SOURCE: AMAX PHOSPHATE FACIL                                      CITY: PALMETTO             ST: FL                   **
**   STATION ID: MW-04                                                 COLLECTION START: 10/16/90  1520   STOP: 00/00/00  **
**   CASE.NO.: 15099            SAS NO.:                               D. NO.: Y327               MD NO: Y327              **
**                                                                                                                         **
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RESULTS	UNITS	PARAMETER
10UJ	UG/L	CYANIDE

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT — 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL — PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL — CITY: PALMETTO ST: FL
STATION ID: SD-11 — COLLECTION START: 10/17/90 1505 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y159

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
1400U	PHENOL	6700UR	3-NITROANILINE
1400U	BIS(2-CHLOROETHYL) ETHER	1400UR	ACENAPHTHENE
1400U	2-CHLOROPHENOL	6700U	2,4-DINITROPHENOL
1400U	1,3-DICHLOROBENZENE	6700U	4-NITROPHENOL
1400U	1,4-DICHLOROBENZENE	1400U	DIBENZOFURAN
1400U	BENZYL ALCOHOL	1400U	2,4-DINITROTOLUENE
1400U	1,2-DICHLOROBENZENE	1400U	DIETHYL PHTHALATE
1400U	2-METHYLPHENOL	1400U	4-CHLOROPHENYL PHENYL ETHER
1400UR	BIS(2-CHLOROISOPROPYL) ETHER	1400U	FLUORENE
1400U	(3-AND/OR 4-)METHYLPHENOL	6700U	4-NITROANILINE
1400U	N-NITROSODI-N-PROPYLAMINE	6700U	2-METHYL-4,6-DINITROPHENOL
1400U	HEXACHLOROETHANE	1400U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
1400UR	NITROBENZENE	1400U	4-BROMOPHENYL PHENYL ETHER
1400U	ISOPHORONE	1400U	HEXACHLOROBENZENE (HCB)
1400U	2-NITROPHENOL	6700U	PENTACHLOROPHENOL
1400U	2,4-DIMETHYLPHENOL	1400U	PHENANTHRENE
6700U	BENZOIC ACID	1400U	ANTHRACENE
1400U	BIS(2-CHLOROETHOXY) METHANE	150J	DI-N-BUTYLPHTHALATE
1400U	2,4-DICHLOROPHENOL	1400U	FLUORANTHENE
1400UR	1,2,4-TRICHLOROBENZENE	1400U	PYRENE
1400U	NAPHTHALENE	1400U	BENZYL BUTYL PHTHALATE
1400U	4-CHLOROANILINE	2800U	3,3'-DICHLOROBENZIDINE
1400U	HEXACHLOROBUTADIENE	1400U	BENZO(A)ANTHRACENE
1400U	4-CHLORO-3-METHYLPHENOL	1400U	CHRYSENE
1400U	2-METHYLNAPHTHALENE	1400U	BIS(2-ETHYLHEXYL) PHTHALATE
1400U	HEXACHLOROCYCLOPENTADIENE (HCCP)	1400U	DI-N-OCTYLPHTHALATE
1400U	2,4,6-TRICHLOROPHENOL	1400U	BENZO(B AND/OR K)FLUORANTHENE
6700U	2,4,5-TRICHLOROPHENOL	1400U	BENZO-A-PYRENE
1400UR	2-CHLORONAPHTHALENE	1400U	INDENO (1,2,3-CD) PYRENE
6700U	2-NITROANILINE	1400U	DIBENZO(A,H)ANTHRACENE
1400U	DIMETHYL PHTHALATE	1400U	BENZO(GHI)PERYLENE
1400U	ACENAPHTHYLENE	52	PERCENT MOISTURE
1400U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-11

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1505 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y159

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
21U	CHLOROMETHANE	11U	1,2-DICHLOROPROPANE
21U	BROMOMETHANE	11U	CIS-1,3-DICHLOROPROPENE
21U	VINYL CHLORIDE	11U	TRICHLOROETHENE(TRICHLOROETHYLENE)
21U	CHLOROETHANE	11U	DIBROMOCHLOROMETHANE
11U	METHYLENE CHLORIDE	11U	1,1,2-TRICHLOROETHANE
21U	ACETONE	11U	BENZENE
11U	CARBON DISULFIDE	11U	TRANS-1,3-DICHLOROPROPENE
11U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	11U	BROMOFORM
11U	1,1-DICHLOROETHANE	21U	METHYL ISOBUTYL KETONE
11U	1,2-DICHLOROETHENE (TOTAL)	21U	METHYL BUTYL KETONE
11U	CHLOROFORM	11U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
11U	1,2-DICHLOROETHANE	11U	1,1,2,2-TETRACHLOROETHANE
21U	METHYL ETHYL KETONE	11U	TOLUENE
11U	1,1,1-TRICHLOROETHANE	11U	CHLOROBENZENE
11U	CARBON TETRACHLORIDE	11U	ETHYL BENZENE
21U	VINYL ACETATE	11U	STYRENE
11U	BROMODICHLOROMETHANE	11U	TOTAL XYLENES
		53	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PESTICIDES/PCB'S DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-11
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1505 STOP: 00/00/00
D. NUMBER: Y159

UG/KG	ANALYTICAL RESULTS
33U	ALPHA-BHC
33U	BETA-BHC
33U	DELTA-BHC
33U	GAMMA-BHC (LINDANE)
40U	HEPTACHLOR
33U	ALDRIN
33U	HEPTACHLOR EPOXIDE
33U	ENDOSULFAN I (ALPHA)
67U	DIELDRIN
67U	4,4'-DDE (P,P'-DDE)
67U	ENDRIN
67U	ENDOSULFAN II (BETA)
67U	4,4'-DDD (P,P'-DDD)
67U	ENDOSULFAN SULFATE
67U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
330U	METHOXYCHLOR
67U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
330U	GAMMA-CHLORDANE /2
330U	ALPHA-CHLORDANE /2
670U	TOXAPHENE
330U	PCB-1016 (AROCLOR 1016)
330U	PCB-1221 (AROCLOR 1221)
330U	PCB-1232 (AROCLOR 1232)
330U	PCB-1242 (AROCLOR 1242)
330U	PCB-1248 (AROCLOR 1248)
670U	PCB-1254 (AROCLOR 1254)
670U	PCB-1260 (AROCLOR 1260)
52	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-12

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1230 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y154

UG/KG	ANALYTICAL RESULTS
15U	CHLOROMETHANE
15U	BROMOMETHANE
15U	VINYL CHLORIDE
15U	CHLOROETHANE
7U	METHYLENE CHLORIDE
20U	ACETONE
7U	CARBON DISULFIDE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
7U	1,1-DICHLOROETHANE
7U	1,2-DICHLOROETHENE (TOTAL)
7U	CHLOROFORM
7U	1,2-DICHLOROETHANE
15U	METHYL ETHYL KETONE
7U	1,1,1-TRICHLOROETHANE
7U	CARBON TETRACHLORIDE
15U	VINYL ACETATE
7U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
7U	1,2-DICHLOROPROPANE
7U	CIS-1,3-DICHLOROPROPENE
7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
7U	DIBROMOCHLOROMETHANE
7U	1,1,2-TRICHLOROETHANE
7U	BENZENE
7U	TRANS-1,3-DICHLOROPROPENE
7U	BROMOFORM
15U	METHYL ISOBUTYL KETONE
15U	METHYL BUTYL KETONE
7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,1,2,2-TETRACHLOROETHANE
7U	TOLUENE
7U	CHLOROBENZENE
7U	ETHYL BENZENE
7U	STYRENE
7U	TOTAL XYLENES
33	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-12 COLLECTION START: 10/17/90 1230 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y154

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
970U	PHENOL	4700UR	3-NITROANILINE
970U	BIS(2-CHLOROETHYL) ETHER	970U	ACENAPHTHENE
970U	2-CHLOROPHENOL	4700U	2,4-DINITROPHENOL
970U	1,3-DICHLOROBENZENE	4700U	4-NITROPHENOL
970U	1,4-DICHLOROBENZENE	970U	DIBENZOFURAN
970U	BENZYL ALCOHOL	970U	2,4-DINITROTOLUENE
970U	1,2-DICHLOROBENZENE	970U	DIETHYL PHTHALATE
970U	2-METHYLPHENOL	970U	4-CHLOROPHENYL PHENYL ETHER
970UR	BIS(2-CHLOROISOPROPYL) ETHER	970U	FLUORENE
970U	(3-AND/OR 4-)METHYLPHENOL	4700U	4-NITROANILINE
970U	N-NITROSODI-N-PROPYLAMINE	4700U	2-METHYL-4,6-DINITROPHENOL
970U	HEXACHLOROETHANE	970U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
970UR	NITROBENZENE	970U	4-BROMOPHENYL PHENYL ETHER
970U	ISOPHORONE	970U	HEXACHLOROBENZENE (HCB)
970U	2-NITROPHENOL	4700U	PENTACHLOROPHENOL
970U	2,4-DIMETHYLPHENOL	970U	PHENANTHRENE
4700U	BENZOIC ACID	970U	ANTHRACENE
970U	BIS(2-CHLOROETHOXY) METHANE	970U	DI-N-BUTYLPHTHALATE
970U	2,4-DICHLOROPHENOL	970U	FLUORANTHENE
970UR	1,2,4-TRICHLOROBENZENE	970U	PYRENE
970U	NAPHTHALENE	970U	BENZYL BUTYL PHTHALATE
970U	4-CHLOROANILINE	1900U	3,3'-DICHLOROBENZIDINE
970U	HEXACHLOROBUTADIENE	970U	BENZO(A)ANTHRACENE
970U	4-CHLORO-3-METHYLPHENOL	970U	CHRYSENE
970U	2-METHYLNAPHTHALENE	970U	BIS(2-ETHYLHEXYL) PHTHALATE
970U	HEXACHLOROCYCLOPENTADIENE (HCCP)	970U	DI-N-OCTYLPHTHALATE
970U	2,4,6-TRICHLOROPHENOL	970U	BENZO(B AND/OR K)FLUORANTHENE
4700U	2,4,5-TRICHLOROPHENOL	970U	BENZO-A-PYRENE
970UR	2-CHLORONAPHTHALENE	970U	INDENO (1,2,3-CD) PYRENE
4700U	2-NITROANILINE	970U	DIBENZO(A,H)ANTHRACENE
970U	DIMETHYL PHTHALATE	970U	BENZO(GHI)PERYLENE
970U	ACENAPHTHYLENE	32	PERCENT MOISTURE
970U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SD-12	COLLECTION START: 10/17/90 1230 STOP: 00/00/00
CASE NO.: 15099 SAS NO.:	D. NO.: Y154 MD NO: Y154

ANALYTICAL RESULTS UG/KG

1000JN	HEXADECANOIC ACID
3000J	2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-12
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1230 STOP: 00/00/00
D. NUMBER: Y154

UG/KG	ANALYTICAL RESULTS
24U	ALPHA-BHC
24U	BETA-BHC
24U	DELTA-BHC
24U	GAMMA-BHC (LINDANE)
24U	HEPTACHLOR
24U	ALDRIN
24U	HEPTACHLOR EPOXIDE
24U	ENDOSULFAN I (ALPHA)
47U	DIELDRIN
47U	4,4'-DDE (P,P'-DDE)
47U	ENDRIN
47U	ENDOSULFAN II (BETA)
47U	4,4' DDD (P,P' DDD)
47U	ENDOSULFAN SULFATE
47U	4,4'-DDT (P,P'-DDT)

L

UG/KG	ANALYTICAL RESULTS
240U	METHOXYCHLOR
47U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
240U	GAMMA-CHLORDANE /2
240U	ALPHA-CHLORDANE /2
470U	TOXAPHENE
240U	PCB-1016 (AROCLOR 1016)
240U	PCB-1221 (AROCLOR 1221)
240U	PCB-1232 (AROCLOR 1232)
240U	PCB-1242 (AROCLOR 1242)
240U	PCB-1248 (AROCLOR 1248)
470U	PCB-1254 (AROCLOR 1254)
470U	PCB-1260 (AROCLOR 1260)
32	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51674 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-01 COLLECTION START: 10/16/90 1330 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y137

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51674 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-01 COLLECTION START: 10/16/90 1330 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y137

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE

UG/L	ANALYTICAL RESULTS
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4-BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51674 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-01 COLLECTION START: 10/16/90 1330 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y137

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4' DDD (P,P' DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.24	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51677 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-02 COLLECTION START: 10/16/90 1415 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y141

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51677   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-02   COLLECTION START: 10/16/90 1415   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y141

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4 BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

*** PROJECT NO. 91-025 SAMPLE NO. 51677 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-02 COLLECTION START: 10/16/90 1415 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y141

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4' DDD (P,P' DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51646 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-04 COLLECTION START: 10/17/90 1620 STOP: 00/00/00 **
**
** CASE NO.: 15099 SAS NO.: D. NO.: Y167 **
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51646 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-04 COLLECTION START: 10/17/90 1620 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y167

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4 BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51646  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON                  **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO                ST: FL                     **
**   STATION ID: SW-04                                               COLLECTION START: 10/17/90  1620   STOP: 00/00/00        **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y167                MD NO: Y167                  **
**                                                                                                                            **
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ANALYTICAL RESULTS UG/L

4JN   BROMACIL

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51646   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-04   COLLECTION START: 10/17/90 1620   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y167

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS   1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51644 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-05 COLLECTION START: 10/17/90 1645 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y169

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51644 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-05 COLLECTION START: 10/17/90 1645 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y169

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51644   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-05   COLLECTION START: 10/17/90 1645   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y169

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4' DDD (P,P' DDD)
0.20U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB 1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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*C-CONFIRMED BY GCMS   1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51656 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-06 COLLECTION START: 10/17/90 1440 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y157

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51656 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-06 COLLECTION START: 10/17/90 1440 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y157

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE

UG/L	ANALYTICAL RESULTS
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4 BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
40U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51656  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO             ST: FL                   **
**   STATION ID: SW-06                                                COLLECTION START: 10/17/90  1440   STOP: 00/00/00   **
**   CASE NO.: 15099          SAS NO.:                                D. NO.: Y157               MD NO: Y157              **
**                                                                                                                        **
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ANALYTICAL RESULTS UG/L

100J   3 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51656   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-06   COLLECTION START: 10/17/90 1440   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y157

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS   1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51654 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-07 COLLECTION START: 10/17/90 1515 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y161

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

** PROJECT NO. 91-025 SAMPLE NO. 51654 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-07 COLLECTION START: 10/17/90 1515 STOP: 00/00/00 **
** CASE NO.: 15099 SAS NO.: D. NO.: Y161 **

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51654 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-07 COLLECTION START: 10/17/90 1515 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y161

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51647 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-08 COLLECTION START: 10/17/90 1605 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y165

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51647 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-08 COLLECTION START: 10/17/90 1605 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y165

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE

UG/L	ANALYTICAL RESULTS
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4 BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S/DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51647 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-08 COLLECTION START: 10/17/90 1605 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y165

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4' DDD (P,P'-DDD)
0.20U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB 1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

** PROJECT NO. 91-025 SAMPLE NO. 51647 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-08 COLLECTION START: 10/17/90 1605 STOP: 00/00/00 **
** CASE NO.: 15099 SAS NO.: D. NO.: Y165 MD NO: Y165 **

ANALYTICAL RESULTS UG/L

4JN' BROMACIL

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51651 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-09 COLLECTION START: 10/17/90 1515 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y163

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
50U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
50U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51651 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-09 COLLECTION START: 10/17/90 1515 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y163

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4 BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51651  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO           ST: FL                  **
**   STATION ID: SW-09                                                COLLECTION START: 10/17/90  1515   STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y163             MD NO: Y163             **
**                                                                                                                     **
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ANALYTICAL RESULTS UG/L

10JN	HEXADECANOIC ACID
5JN	HYDROXYMETHOXYBENZALDEHYDE
60J	4 UNIDENTIFIED COMPOUNDS
N	PETROLEUM PRODUCT

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51651   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-09   COLLECTION START: 10/17/90 1515   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y163

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS   1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y158

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
70U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
30U	ACETONE	5U	BENZENE
4J	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y158 MD NO: Y158 **
** **
*** ***

ANALYTICAL RESULTS UG/L

8JN TETRAMETHYLBUTANE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y158

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE

UG/L	ANALYTICAL RESULTS
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4 BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51650   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-11   COLLECTION START: 10/17/90 1445   STOP: 00/00/00
CASE NO.: 15099   SAS NO.:   D. NO.: Y158   MD NO: Y158

ANALYTICAL RESULTS UG/L

7JN	TETRADECANOIC ACID
10JN	HEXADECANOIC ACID

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y158

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4' DDD (P,P' DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.60U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51683 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-01 COLLECTION START: 10/16/90 1625 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y142

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51683 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-01 COLLECTION START: 10/16/90 1625 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y142

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4 BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	~~10U~~	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51683 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-01 COLLECTION START: 10/16/90 1625 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y142

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4' DDD (P,P'-DDD)
0.10U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51690 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: TW-02
PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1040 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y146

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	~~CARBON DISULFIDE~~	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51690   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: TW-02   COLLECTION START: 10/17/90 1040   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y146

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
42J	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS   ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51690 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-02 COLLECTION START: 10/17/90 1040 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y146

UG/L	ANALYTICAL RESULTS
0.10U	ALPHA-BHC
0.10U	BETA-BHC
0.10U	DELTA-BHC
0.10U	GAMMA-BHC (LINDANE)
0.10U	HEPTACHLOR
0.10U	ALDRIN
0.10U	HEPTACHLOR EPOXIDE
0.10U	ENDOSULFAN I (ALPHA)
0.20U	DIELDRIN
0.20U	4,4'-DDE (P,P'-DDE)
0.20U	ENDRIN
0.20U	ENDOSULFAN II (BETA)
0.20U	4,4'-DDD (P,P'-DDD)
0.20U	ENDOSULFAN SULFATE
0.20U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
1.0U	METHOXYCHLOR
0.20U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
1.0U	GAMMA-CHLORDANE /2
1.0U	ALPHA-CHLORDANE /2
2.0U	TOXAPHENE
1.0U	PCB-1016 (AROCLOR 1016)
1.0U	PCB-1221 (AROCLOR 1221)
1.0U	PCB-1232 (AROCLOR 1232)
1.0U	PCB-1242 (AROCLOR 1242)
1.0U	PCB-1248 (AROCLOR 1248)
2.0U	PCB-1254 (AROCLOR 1254)
2.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT — 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51672 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-03 COLLECTION START: 10/17/90 1145 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y151

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51672 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-03 COLLECTION START: 10/17/90 1145 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y151

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51672 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-03 COLLECTION START: 10/17/90 1145 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y151

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4' DDD (P,P' DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51662 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-04 COLLECTION START: 10/18/90 1040 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y175

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
40U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51662 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-04 COLLECTION START: 10/18/90 1040 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y175

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
20U	PHENOL	100U	3-NITROANILINE
20U	BIS(2-CHLOROETHYL) ETHER	20U	ACENAPHTHENE
20U	2-CHLOROPHENOL	100U	2,4-DINITROPHENOL
20U	1,3-DICHLOROBENZENE	100U	4-NITROPHENOL
20U	1,4-DICHLOROBENZENE	20U	DIBENZOFURAN
20U	BENZYL ALCOHOL	20U	2,4-DINITROTOLUENE
20U	1,2-DICHLOROBENZENE	20U	DIETHYL PHTHALATE
20U	2-METHYLPHENOL	20U	4-CHLOROPHENYL PHENYL ETHER
20U	BIS(2-CHLOROISOPROPYL) ETHER	20U	FLUORENE
20U	(3-AND/OR 4-)METHYLPHENOL	100U	4-NITROANILINE
20U	N-NITROSODI-N-PROPYLAMINE	100U	2-METHYL-4,6-DINITROPHENOL
20U	HEXACHLOROETHANE	20U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
20U	NITROBENZENE	20U	4-BROMOPHENYL PHENYL ETHER
20U	ISOPHORONE	20U	HEXACHLOROBENZENE (HCB)
20U	2-NITROPHENOL	100U	PENTACHLOROPHENOL
20U	2,4-DIMETHYLPHENOL	20U	PHENANTHRENE
100U	BENZOIC ACID	20U	ANTHRACENE
20U	BIS(2-CHLOROETHOXY) METHANE	20UJ	DI-N-BUTYLPHTHALATE
20U	2,4-DICHLOROPHENOL	20U	FLUORANTHENE
20U	1,2,4-TRICHLOROBENZENE	20U	PYRENE
20U	NAPHTHALENE	20U	BENZYL BUTYL PHTHALATE
20U	4-CHLOROANILINE	40U	3,3'-DICHLOROBENZIDINE
20U	HEXACHLOROBUTADIENE	20UJ	BENZO(A)ANTHRACENE
20U	4-CHLORO-3-METHYLPHENOL	20U	CHRYSENE
20U	2-METHYLNAPHTHALENE	20U	BIS(2-ETHYLHEXYL) PHTHALATE
20U	HEXACHLOROCYCLOPENTADIENE (HCCP)	20U	DI-N-OCTYLPHTHALATE
20U	2,4,6-TRICHLOROPHENOL	20U	BENZO(B AND/OR K)FLUORANTHENE
100U	2,4,5-TRICHLOROPHENOL	20U	BENZO-A-PYRENE
20U	2-CHLORONAPHTHALENE	20U	INDENO (1,2,3-CD) PYRENE
100U	2-NITROANILINE	20U	DIBENZO(A,H)ANTHRACENE
20U	DIMETHYL PHTHALATE	20U	BENZO(GHI)PERYLENE
20U	ACENAPHTHYLENE		
20U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PESTICIDES/PCB'S DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51662 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-04 COLLECTION START: 10/18/90 1040 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y175

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.10U	ALPHA-BHC	1.0U	METHOXYCHLOR
0.10U	BETA-BHC	0.20U	ENDRIN KETONE
0.10U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.10U	GAMMA-BHC (LINDANE)	1.0U	GAMMA-CHLORDANE /2
0.10U	HEPTACHLOR	1.0U	ALPHA-CHLORDANE /2
0.10U	ALDRIN	2.0U	TOXAPHENE
0.10U	HEPTACHLOR EPOXIDE	1.0U	PCB-1016 (AROCLOR 1016)
0.10U	ENDOSULFAN I (ALPHA)	1.0U	PCB-1221 (AROCLOR 1221)
0.20U	DIELDRIN	1.0U	PCB-1232 (AROCLOR 1232)
0.20U	4,4'-DDE (P,P'-DDE)	1.0U	PCB-1242 (AROCLOR 1242)
0.20U	ENDRIN	1.0U	PCB-1248 (AROCLOR 1248)
0.20U	ENDOSULFAN II (BETA)	2.0U	PCB-1254 (AROCLOR 1254)
0.20U	4,4' DDD (P,P' DDD)	2.0U	PCB 1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.20U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51664   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: TW-05   COLLECTION START: 10/18/90 0930   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y172

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
70U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51664 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-05 COLLECTION START: 10/18/90 0930 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y172

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51664 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: TW-05
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 0930 STOP: 00/00/00
D. NUMBER: Y172

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.30U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES

*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

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**  PROJECT NO. 91-025   SAMPLE NO. 51664  SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON               **
**  SOURCE: AMAX PHOSPHATE FACIL                                  CITY: PALMETTO               ST: FL                  **
**  STATION ID: TW-05                                             COLLECTION START: 10/18/90  0930   STOP: 00/00/00    **
**  CASE.NO.: 15099          SAS NO.:                             D. NO.: Y172                MD NO: Y172              **
**                                                                                                                      **
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ANALYTICAL RESULTS UG/L

7JN   TETRAMETHYLBUTANE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51642 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PB-01 COLLECTION START: 10/15/90 0630 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y325

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51642 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PB-01 COLLECTION START: 10/15/90 0630 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y325

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51642 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: PB-01
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 0630 STOP: 00/00/00
D. NUMBER: Y325

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4'-DDD (P,P'-DDD)
0.30U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB 1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51642 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PB-01 COLLECTION START: 10/15/90 0630 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y325 MD NO: Y325

ANALYTICAL RESULTS UG/L

6JN ACETALDEHYDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

** PROJECT NO. 91-025 SAMPLE NO. 51673 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: MW-01 COLLECTION START: 10/16/90 1130 STOP: 00/00/00 **
** CASE NO.: 15099 SAS NO.: D. NO.: Y326 **

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51673 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-01 COLLECTION START: 10/16/90 1130 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y326

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE

UG/L	ANALYTICAL RESULTS
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4-BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51673 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: MW-01 COLLECTION START: 10/16/90 1130 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y326 **
** **
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**  PROJECT NO. 91-025   SAMPLE NO. 51673  SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON         **
**  SOURCE: AMAX PHOSPHATE FACIL                                   CITY: PALMETTO              ST: FL                **
**  STATION ID: MW-01                                              COLLECTION START: 10/16/90  1130   STOP: 00/00/00 **
**  CASE NO.: 15099          SAS NO.:                              D. NO.: Y326                MD NO: Y326           **
**                                                                                                                   **
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ANALYTICAL RESULTS UG/L

10JN	DIETHYLMETHYLBENZAMIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-03 COLLECTION START: 10/17/90 0900 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y328

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: MW-03

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 0900 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y328

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4 BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: MW-03
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 0900 STOP: 00/00/00
D. NUMBER: Y328

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4' DDD (P,P' DDD)
0.20U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: MW-03
CASE NO.: 15099 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 0900 STOP: 00/00/00
D. NO.: Y328 MD NO: Y328

ANALYTICAL RESULTS UG/L

20JN	BUTYLIDENEBISDIMETHYLETHYLMETHYLPHENOL
5JN	OCTANOIC ACID

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51679 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: MW-04

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1520 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y327

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
14	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

EXTRACTABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51679 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-04 COLLECTION START: 10/16/90 1520 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y327

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	76	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51679 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: MW-04
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1520 STOP: 00/00/00
D. NUMBER: Y327

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4'-DDD (P,P'-DDD)
0.30U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51679 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-04 COLLECTION START: 10/16/90 1520 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y327 MD NO: Y327

ANALYTICAL RESULTS UG/L

100JN	CAPROLACTAM
20JN	BUTYLIDENBISDIMETHYLETHYLMETHYLPHENOL
20J	1 UNIDENTIFIED COMPOUND

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y329

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
8U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51676   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: MW-05   COLLECTION START: 10/16/90 1350   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y329

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y329

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4' DDD (P,P' DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y329 MD NO: Y329

ANALYTICAL RESULTS UG/L

6JN	OCTANOIC ACID
5JN	DECANOIC ACID
30JN	BIS(HYDROXYETHYL)DODECANAMIDE
10JN	BUTYLIDENEBISDIMETHYLETHYLMETHYLPHENOL
100J	3 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51682 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-06 COLLECTION START: 10/16/90 1615 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y143

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
50U	ACETONE	5U	BENZENE
130	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51682   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: MW-06   COLLECTION START: 10/16/90 1615   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y143

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE

UG/L	ANALYTICAL RESULTS
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4 BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51682 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-06 COLLECTION START: 10/16/90 1615 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y143

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4' DDD (P,P' DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51682 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-06 COLLECTION START: 10/16/90 1615 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y143 MD NO: Y143

ANALYTICAL RESULTS UG/L

70JN	CAPROLACTAM

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51684 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PW-01 COLLECTION START: 10/17/90 0935 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y147

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51684 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PW-01 COLLECTION START: 10/17/90 0935 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y147

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4 BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51684 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: PW-01
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 0935 STOP: 00/00/00
D. NUMBER: Y147

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4' DDD (P,P' DDD)	1.0U	PCB 1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51691 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: TB-01S

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/12/90 0700 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y324

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
11U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
11U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
11U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
11U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
39	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	11U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	11U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
11U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
11U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES
		7	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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Sample ID                 R4SF90.06723
Sample type               SOIL
Collection date, time     10/16/90  15:20
Receipt date              10/24/90
Completion date            3/19/91
Flag date                 12/23/90
Location                  FL:PALMETTO
Other ID's                91-025,SS-01:6
Comments                  AMAX PHOSPHATE FACILITY,440660, SURFACE SOIL #01
Report to                 GERRY LUSTER

 Type of analysis         ********** RA226    **********
  Verified by             AS ( 2/26/91) and GL ( 2/26/91)
  Date, time counted       2/13/91   0:00
  Length of count         1000 min
  Preparer                ACJB
  Counting system         LCC
  Sample size               0.500000 GASH
  Comments
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-226     9.5000E-01       5.00 %  PCI/GASH  10/16/90
    RA-226     8.9000E-01       5.00 %  PCI/GDRY  10/16/90
    RA-226     6.4000E-01       5.00 %  PCI/GWET  10/16/90

 Type of analysis         ********** RA228    **********
  Verified by             GL ( 3/19/91) and AS ( 3/19/91)
  Date, time counted       3/18/91  10:03
  Length of count          100 min
  Preparer                ZS
  Counting system         1A3
  Sample size               0.500000 GASH
  Comments                .40 PCI/GWET   .56 PCI/GDRY
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-228     6.0090E-01     153.09 %  PCI/GASH   3/18/91
    RA-228     5.6000E-01     153.00 %  PCI/GDRY  10/16/90
    RA-228     4.0000E-01     153.00 %  PCI/GWET  10/16/90
```

```
Sample ID                  R4SF90.06724
Sample type                SOIL
Collection date, time      10/17/90  12:05
Receipt date               10/24/90
Completion date             3/19/91
Flag date                  12/23/90
Location                   FL:PALMETTO
Other ID's                 91-025,SS-06:6
Comments                   AMAX PHOSPHATE FACILITY,440569,SURFACE SOIL #06
Report to                  GERRY LUSTER

 Type of analysis          ********** RA226     **********
  Verified by             AS ( 2/26/91) and GL ( 2/26/91)
  Date, time counted        2/13/91   0:00
  Length of count          1000 min
  Preparer                 ACJB
  Counting system          LCD
  Sample size                0.500000 GASH
  Comments
    NUCLIDE    ACTIVITY    2 SIG ERROR    UNITS     DATE
    RA-226     8.6600E+00       1.00 %  PCI/GASH  10/17/90
    RA-226     8.1200E+00       1.00 %  PCI/GDRY  10/17/90
    RA-226     6.2000E+00       1.00 %  PCI/GWET  10/17/90

 Type of analysis          ********** RA228     **********
  Verified by             GL ( 3/19/91) and AS ( 3/19/91)
  Date, time counted        3/18/91  10:03
  Length of count           100 min
  Preparer                 ZS
  Counting system          1A4
  Sample size                0.500000 GASH
  Comments                 .37 PCI/GWET  .49 PCI/GDRY
    NUCLIDE    ACTIVITY    2 SIG ERROR    UNITS     DATE
    RA-228     5.1660E-01     186.28 %  PCI/GASH   3/18/91
    RA-228     4.9000E-01     186.00 %  PCI/GDRY  10/17/90
    RA-228     3.7000E-01     186.00 %  PCI/GWET  10/17/90
```

```
Sample ID                 R4SF90,06725
Sample type               SOIL
Collection date, time     10/17/90  11:50
Receipt date              10/24/90
Completion date            3/19/91
Flag date                 12/23/90
Location                  FL:PALMETTO
Other ID's                91-025,SS-07;6
Comments                  AMAX PHOSPHATE FACILITY,440573,SURFACE SOIL #07
Report to                 GERRY LUSTER

 Type of analysis         ********** RA226    **********
  Verified by            AS ( 2/26/91) and GL ( 2/26/91)
  Date, time counted       2/13/91   0:00
  Length of count         1000 min
  Preparer                ACJB
  Counting system         LCE
  Sample size               0.500000 GASH
  Comments
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-226    1.6980E+01       1.00 %  PCI/GASH  10/17/90
    RA-226    1.6540E+01       1.00 %  PCI/GDRY  10/17/90
    RA-226    1.3500E+01       1.00 %  PCI/GWET  10/17/90

 Type of analysis         ********** RA228    **********
  Verified by            GL ( 3/19/91) and AS ( 3/19/91)
  Date, time counted       3/18/91  10:03
  Length of count          100 min
  Preparer                ZS
  Counting system         1B1
  Sample size               0.500000 GASH
  Comments                6.6 PCI/GWET  8.1 PCI/GDRY
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-228    8.2990E+00      16.74 %  PCI/GASH   3/18/91
    RA-228    8.1000E+00      17.00 %  PCI/GDRY  10/17/90
    RA-228    6.6000E+00      17.00 %  PCI/GWET  10/17/90
```

```
Sample ID                  R4SF90.06733
Sample type                SEDIMENT
Collection date, time      10/16/90  13:35
Receipt date               10/24/90
Completion date             0/ 0/00
Flag date                  12/23/90
Location                   FL:PALMETTO
Other ID's                 91-025,SD-01:6
Comments                   AMAX PHOSPHATE FACILITY,440645,SEDIMENT #01
Report to                  GERRY LUSTER

 Type of analysis          ********** RA226    **********
  Verified by             AS ( 2/25/91) and GL ( 2/25/91)
  Date, time counted        2/14/91    0:00
  Length of count          1000 min
  Preparer                 ACJB
  Counting system          LCH
  Sample size                0.500000 GASH
  Comments
    NUCLIDE     ACTIVITY    2 SIG ERROR    UNITS     DATE
    RA-226     3.7000E-01       7.00 %  PCI/GASH  10/16/90
    RA-226     3.6000E-01       7.00 %  PCI/GDRY  10/16/90
    RA-226     2.7000E-01       7.00 %  PCI/GWET  10/16/90

 Type of analysis          ********** RA228    **********
  Verified by             AS ( 3/13/91) and GL ( 3/13/91)
  Date, time counted        3/ 5/91    9:55
  Length of count           100 min
  Preparer                 ZS
  Counting system          2B2
  Sample size                0.500000 GASH
  Comments
    NUCLIDE     ACTIVITY    2 SIG ERROR    UNITS     DATE
    RA-228     8.5140E-01     115.48 %  PCI/GASH   3/ 5/91
    RA-228     8.4650E-01     115.00 %  PCI/GDRY  10/16/90
    RA-228     6.3570E-01     115.00 %  PCI/GWET  10/16/90
```

```
Sample ID                  R4SF90.06728
Sample type                SEDIMENT
Collection date, time      10/17/90  14:45
Receipt date               10/24/90
Completion date             0/ 0/00
Flag date                  12/23/90
Location                   FL:PALMETTO
Other ID's                 91-025,SD-06:6
Comments                   AMAX PHOSPHATE FACILITY,440584,SEDIMENT #06
Report to                  GERRY LUSTER

 Type of analysis          ********** RA226    **********
  Verified by             AS ( 2/25/91) and GL ( 2/25/91)
  Date, time counted        2/14/91   0:00
  Length of count          1000 min
  Preparer                 ACJB
  Counting system          LCH
  Sample size                0.500000 GASH
  Comments
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-226     7.7000E-01       5.00 %  PCI/GASH  10/17/90
    RA-226     7.6000E-01       5.00 %  PCI/GDRY  10/17/90
    RA-226     6.2000E-01       5.00 %  PCI/GWET  10/17/90

 Type of analysis          ********** RA228    **********
  Verified by             AS ( 3/13/91) and GL ( 3/13/91)
  Date, time counted        3/ 5/91   9:55
  Length of count           100 min
  Preparer                 ZS
  Counting system          2A4
  Sample size                0.500000 GASH
  Comments
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-228     3.8380E-01     256.49 %  PCI/GASH   3/ 5/91
    RA-228     3.8000E-01     256.00 %  PCI/GDRY  10/17/90
    RA-228     3.0670E-01     256.00 %  PCI/GWET  10/17/90
```

Sample ID	R4SF90.06729
Sample type	SEDIMENT
Collection date, time	10/17/90 12:30
Receipt date	10/24/90
Completion date	0/ 0/00
Flag date	12/23/90
Location	FL:PALMETTO
Other ID's	91-025,SD-12:6
Comments	AMAX PHOSPHATE FACILITY,440577,SEDIMENT #12
Report to	GERRY LUSTER

Type of analysis	********** RA226 **********
Verified by	AS (2/25/91) and GL (2/25/91)
Date, time counted	2/14/91 0:00
Length of count	1000 min
Preparer	ACJB
Counting system	LCH
Sample size	0.500000 GASH
Comments	

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	7.9400E+00	1.00 %	PCI/GASH	10/17/90
RA-226	7.3600E+00	1.00 %	PCI/GDRY	10/17/90
RA-226	4.7400E+00	1.00 %	PCI/GWET	10/17/90

Type of analysis	********** RA228 **********
Verified by	AS (3/13/91) and GL (3/13/91)
Date, time counted	3/ 5/91 9:55
Length of count	100 min
Preparer	ZS
Counting system	2B1
Sample size	0.500000 GASH
Comments	

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-228	-7.8590E-01	127.88 %	PCI/GASH	3/ 5/91
RA-228	-7.2760E-01	128.00 %	PCI/GDRY	10/17/90
RA-228	-4.6890E-01	128.00 %	PCI/GWET	10/17/90

```
Sample ID                  R4SF90,06732
Sample type                WATER
Collection date, time      10/16/90  16:25
Receipt date               10/24/90
Completion date             3/14/91
Flag date                  12/23/90
Location                   FL:PALMETTO
Other ID's                 91-025,TW-01:2
Comments                   AMAX PHOSPHATE FACILITY,440679,TEMPORARY WELL #01
Report to                  GERRY LUSTER

 Type of analysis          ********** ALPHA     **********
  Verified by             GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted       11/ 8/90   9:59
  Length of count           100 min
  Preparer                AC
  Counting system          T1B2
  Sample size                0.050000 L
  Comments                  746.0 MG/L WT= 37.30 GCPM=     1.17 BCPM=0.12 ABS FACT
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    ALPHA     5.3800E+01      21.64 %  PCI/L     11/ 8/90 EFF= 0.192

 Type of analysis          ********** RA226     **********
  Verified by             GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted       12/18/90   0:00
  Length of count          1000 min
  Preparer                 ACIB
  Counting system          LCJ
  Sample size                0.200000 L
  Comments
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-226    7.3200E+00       2.00 %  PCI/L     10/16/90

 Type of analysis          ********** RA228     **********
  Verified by             AS ( 3/14/91) and GL ( 3/14/91)
  Date, time counted        2/28/91   9:59
  Length of count           100 min
  Preparer                 ZS
  Counting system          2B2
  Sample size                0.200000 L
  Comments
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-228    2.4250E+00      87.51 %  PCI/L      2/28/91

 Type of analysis          ********** BETA      **********
  Verified by             GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted       11/ 8/90   9:59
  Length of count           100 min
  Preparer                AC
  Counting system          T2B2
  Sample size                0.050000 L
  Comments                  746.0 MG/L WT= 37.30 GCPM=     3.60 BCPM=0.79 ABS FACT
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS     DATE
    BETA      6.0270E+01      14.91 %  PCI/L     11/ 8/90 EFF= 0.420
```

```
Sample ID                R4SF90,06726
Sample type              WATER
Collection date, time    10/16/90   9:00
Receipt date             10/24/90
Completion date           3/20/91
Flag date                12/23/90
Location                 FL:PALMETTO
Other ID's               91-025,MW-03:2
Comments                 AMAX PHOSPHATE FACILITY,440673,MONITOR WELL #03
Report to                GERRY LUSTER

 Type of analysis        ********** ALPHA    **********
  Verified by           GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted     11/ 8/90   9:59
  Length of count         100 min
  Preparer               AC
  Counting system        T2A1
  Sample size              0.100000 L
  Comments               2560.0 MG/L WT=256.00 GCPM=     0.39 BCPM=0.07 ABS FACT
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS    DATE
    ALPHA     4.4580E+01      42.40 %  PCI/L     11/ 8/90 EFF= 0.078

 Type of analysis        ********** RA226    **********
  Verified by           GL (12/18/90) and GL (12/18/90)
  Date, time counted     12/ 6/90   0:00
  Length of count        1000 min
  Preparer               ACIB
  Counting system        LCE
  Sample size              0.400000 L
  Comments
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS    DATE
    RA-226    1.6430E+01       1.00 %  PCI/L     10/16/90

 Type of analysis        ********** RA228    **********
  Verified by           GL ( 3/20/91) and AS ( 3/20/91)
  Date, time counted      3/13/91  10:43
  Length of count         100 min
  Preparer               ZS
  Counting system        1B2
  Sample size              0.400000 L
  Comments
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS    DATE
    RA-228    1.7630E+00      64.55 %  PCI/L      3/13/91

 Type of analysis        ********** BETA     **********
  Verified by           GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted     11/ 8/90   9:59
  Length of count         100 min
  Preparer               AC
  Counting system        T2A1
  Sample size              0.100000 L
  Comments               2560.0 MG/L WT=256.00 GCPM=     2.55 BCPM=0.82 ABS FACT=
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS    DATE
    BETA      1.8550E+01      21.23 %  PCI/L     11/ 8/90 EFF= 0.420
```

```
Sample ID                R4SF90.06727
Sample type              WATER
Collection date, time    10/16/90  16:15
Receipt date             10/24/90
Completion date           3/19/91
Flag date                12/23/90
Location                 FL:PALMETTO
Other ID's               91-025,MW-06:2
Comments                 AMAX PHOSPHATE FACILITY,440685,MONITOR WELL #06
Report to                GERRY LUSTER

 Type of analysis        ********** ALPHA    **********
  Verified by           GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted     11/ 8/90   9:59
  Length of count         100 min
  Preparer               AC
  Counting system        T2A2
  Sample size              0.100000 L
  Comments                328.0 MG/L WT= 32.80 GCPM=      0.21 BCPM=0.14 ABS FACT
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS     DATE
    ALPHA     1.7540E+00    169.04 %  PCI/L     11/ 8/90 EFF= 0.194

 Type of analysis        ********** RA226    **********
  Verified by           GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted     12/18/90   0:00
  Length of count        1000 min
  Preparer               ACIB
  Counting system        LCH
  Sample size                 1.000 L
  Comments               A
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-226    1.1300E+00       3.00 %  PCI/L     10/16/90 A

 Type of analysis        ********** RA228    **********
  Verified by           AS ( 3/14/91) and GL ( 3/14/91)
  Date, time counted      2/28/91   9:59
  Length of count         100 min
  Preparer               ZS
  Counting system        2A4
  Sample size                 1.000 L
  Comments               A
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-228    5.2630E-01      81.00 %  PCI/L      2/28/91 A

 Type of analysis        ********** BETA     **********
  Verified by           GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted     11/ 8/90   9:59
  Length of count         100 min
  Preparer               AC
  Counting system        T2A2
  Sample size              0.100000 L
  Comments                328.0 MG/L WT= 32.80 GCPM=      1.90 BCPM=1.00 ABS FACT
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS     DATE
    BETA      9.6530E+00     37.84 %  PCI/L     11/ 8/90 EFF= 0.420

 Type of analysis        ********** RA226    **********
  Verified by           JB ( 1/ 8/91) and GL ( 1/ 8/91)
  Date, time counted      1/ 7/91   0:00
  Length of count        1000 min
  Preparer               ACIB
```

```
Counting system       100
Sample size                1,000 L
Comments              B
  NUCLIDE    ACTIVITY    2 SIG ERROR    UNITS     DATE
  RA-226     1.0500E+00       3.00 %  PCI/L     10/16/90 B

Type of analysis      ********** RA228    **********
Verified by          GL ( 3/19/91) and AS ( 3/19/91)
Date, time counted     3/18/91  10:03
Length of count        100 min
Preparer              ZS
Counting system       1B2
Sample size                1,000 L
Comments              B
  NUCLIDE    ACTIVITY    2 SIG ERROR    UNITS     DATE
  RA-228    -4.7740E-01      99.71 %  PCI/L      3/18/91 B
```

```
Sample ID                 R4SF90.06730
Sample type               WATER
Collection date, time     10/16/90  13:30
Receipt date              10/24/90
Completion date            3/14/91
Flag date                 12/23/90
Location                  FL:PALMETTO
Other ID's                91-025,SW-01:1
Comments                  AMAX PHOSPHATE FACILITY,440656,SURFACE WATER #01
Report to                 GERRY LUSTER

 Type of analysis         ********** ALPHA     **********
  Verified by            GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted      11/ 8/90   9:59
  Length of count          100 min
  Preparer               AC
  Counting system        T2A3
  Sample size               0.050000 L
  Comments               3708.0 MG/L WT=185.40 GCPM=      0.16 BCPM=0.31 ABS FACT
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS    DATE
    ALPHA     -1.9290E+01      91.39 %  PCI/L     11/ 8/90 EFF= 0.122

 Type of analysis         ********** RA226     **********
  Verified by            GL (12/18/90) and GL (12/18/90)
  Date, time counted      12/13/90   0:00
  Length of count         1000 min
  Preparer               ACIB
  Counting system        LCA
  Sample size                  1.000 L
  Comments
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS    DATE
    RA-226    6.1000E-01       4.00 %  PCI/L     10/16/90

 Type of analysis         ********** RA228     **********
  Verified by            AS ( 3/14/91) and GL ( 3/14/91)
  Date, time counted        3/12/91  14:27
  Length of count          100 min
  Preparer               ZS
  Counting system        1A3
  Sample size                  1.000 L
  Comments
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS    DATE
    RA-228    5.7200E-01      78.32 %  PCI/L      3/12/91

 Type of analysis         ********** BETA      **********
  Verified by            GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted      11/ 8/90   9:59
  Length of count          100 min
  Preparer               AC
  Counting system        T2A3
  Sample size               0.050000 L
  Comments               3708.0 MG/L WT=185.40 GCPM=      3.13 BCPM=1.01 ABS FACT
    NUCLIDE    ACTIVITY   2 SIG ERROR    UNITS    DATE
    BETA      4.5470E+01      19.20 %  PCI/L     11/ 8/90 EFF= 0.420
```

```
Sample ID                  R4SF90.06730X
Sample type                WATER
Collection date, time      10/16/90  13:30
Receipt date               10/24/90
Completion date             3/14/91
Flag date                  12/23/90
Location                   FL:PALMETTO
Other ID's                 91-025,SW-01:1
Comments                   AMAX PHOSPHATE FACILITY,440656,SURFACE WATER #01
Report to                  GERRY LUSTER

 Type of analysis          ********** ALPHA     **********
  Verified by             GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted       11/ 8/90   9:59
  Length of count           100 min
  Preparer                 AC
  Counting system          T2A4
  Sample size                0.050000 L
  Comments                 3660.0 MG/L WT=183.00 GCPM=      0.13 BCPM=0.09 ABS FACT
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS     DATE
    ALPHA     5.0480E+00    234.55 %  PCI/L     11/ 8/90 EFF= 0.123

 Type of analysis          ********** RA226     **********
  Verified by             GL (12/18/90) and GL (12/18/90)
  Date, time counted       12/13/90   0:00
  Length of count          1000 min
  Preparer                 ACIB
  Counting system          LCB
  Sample size                   1.000 L
  Comments
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-226    5.4000E-01      4.00 %  PCI/L     10/16/90

 Type of analysis          ********** RA228     **********
  Verified by             AS ( 3/14/91) and GL ( 3/14/91)
  Date, time counted        3/12/91  14:27
  Length of count           100 min
  Preparer                 ZS
  Counting system          1A4
  Sample size                   1.000 L
  Comments
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS     DATE
    RA-228    5.2800E-01     85.83 %  PCI/L      3/12/91

 Type of analysis          ********** BETA      **********
  Verified by             GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted       11/ 8/90   9:59
  Length of count           100 min
  Preparer                 AC
  Counting system          T2A4
  Sample size                0.050000 L
  Comments                 3660.0 MG/L WT=183.00 GCPM=      2.94 BCPM=0.82 ABS FACT:
    NUCLIDE   ACTIVITY   2 SIG ERROR    UNITS     DATE
    BETA      4.5470E+01     18.30 %  PCI/L     11/ 8/90 EFF= 0.420
```

```
Sample ID                    R4SF90.06731
Sample type                  WATER
Collection date, time        10/16/90  14:40
Receipt date                 10/24/90
Completion date               0/ 0/00
Flag date                    12/23/90
Location                     FL:PALMETTO
Other ID's                   91-025,SW-06:1
Comments                     AMAX PHOSPHATE FACILITY,440590,SURFACE WATER #06
Report to                    GERRY LUSTER

 Type of analysis           ********** ALPHA     **********
  Verified by              GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted        11/ 8/90    9:59
  Length of count            100 min
  Preparer                  AC
  Counting system           T2B1
  Sample size                  0.100000 L
  Comments                   980.0 MG/L WT= 98.00 GCPM=      0.24 BCPM=0.10 ABS FACT
    NUCLIDE    ACTIVITY    2 SIG ERROR    UNITS     DATE
    ALPHA      5.3020E+00      83.31 %  PCI/L      11/ 8/90 EFF= 0.153

 Type of analysis           ********** RA228     **********
  Verified by              AS ( 3/14/91) and GL ( 3/14/91)
  Date, time counted         2/28/91    9:59
  Length of count            100 min
  Preparer                  ZS
  Counting system           2B1
  Sample size                       1.000 L
  Comments
    NUCLIDE    ACTIVITY    2 SIG ERROR    UNITS     DATE
    RA-228     2.8620E-01    181.90 %  PCI/L       2/28/91

 Type of analysis           ********** BETA      **********
  Verified by              GL ( 1/ 3/91) and GL ( 1/ 3/91)
  Date, time counted        11/ 8/90    9:59
  Length of count            100 min
  Preparer                  AC
  Counting system           T2B1
  Sample size                  0.100000 L
  Comments                   980.0 MG/L WT= 98.00 GCPM=      1.49 BCPM=0.78 ABS FACT
    NUCLIDE    ACTIVITY    2 SIG ERROR    UNITS     DATE
    BETA       7.6150E+00      42.44 %  PCI/L      11/ 8/90 EFF= 0.420

 Type of analysis           ********** RA226     **********
  Verified by              JB ( 1/ 8/91) and GL ( 1/ 8/91)
  Date, time counted        12/18/90    0:00
  Length of count           1000 min
  Preparer                  ACIB
  Counting system           LCI
  Sample size                       1.000 L
  Comments
    NUCLIDE    ACTIVITY    2 SIG ERROR    UNITS     DATE
    RA-226     1.8500E+00       2.00 %  PCI/L      10/16/90
```

APPENDIX C

Site Inspection Report

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D043055151

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
AMAX Phosphate Facility	P.O. Box 1329

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Palmetto	FL	34220	Manatee		

09 COORDINATES — LATITUDE: 27 37 24. — LONGITUDE: 82 31 54.

10 TYPE OF OWNERSHIP (Check one)
☑ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION (MONTH DAY YEAR)	02 SITE STATUS	03 YEARS OF OPERATION
10 16 90	☑ ACTIVE ☐ INACTIVE	1966 (BEGINNING YEAR) / present (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)
☐ A. EPA ☑ B. EPA CONTRACTOR ________ (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ________ (Name of firm)
☐ E. STATE ☐ F. STATE CONTRACTOR ________ (Name of firm) ☐ G. OTHER ________ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Maureen Gordon, PhD	Chemist	NUS	(404 938-771

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
Terry Sawyer	Geologist	NUS	( )
Andy Spaugh	Technician	NUS	( )
Ron Young	Technician	NUS	( )
Mark Adams	Technician	NUS	( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO.
Ivan Nance	Environ.	Above	(813 722-45
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☑ PERMISSION ☐ WARRANT		

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Ivan Nance	Royster Phosphate Inc	(813) 722-45

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE (MONTH DAY YEAR)
Maureen Gordon, PhD	EPA	NUS	404 938-7710	4/11/91

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE: FL
02 SITE NUMBER: D043055151

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)
A. SOLID
B. POWDER, FINES
C. SLUDGE
D. OTHER ________ (Specify)
E. SLURRY
F. LIQUID
G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)
TONS ________
CUBIC YARDS ________
NO. OF DRUMS ________

03 WASTE CHARACTERISTICS (Check all that apply)
A. TOXIC
B. CORROSIVE
C. RADIOACTIVE
D. PERSISTENT
E. SOLUBLE
F. INFECTIOUS
G. FLAMMABLE
H. IGNITABLE
I. HIGHLY VOLATILE
J. EXPLOSIVE
K. REACTIVE
L. INCOMPATIBLE
M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS	750 tons/day DAP		
ACD	ACIDS	2000 tons/day H_2SO_4, 542 tons/day P_2O_5		
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
ACD	sulfuric acid		Tanks		
	Ra226/Ra228		In gypsum		
	P_2O_5		Tanks		
	DAP				
	acid anhydrides from stacks				
	HF from acid with fluorides				
	Gypsum - $CaSO_4$		Stacks		

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

File information, interview

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: FL | 02 SITE NUMBER: D043055151

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☑ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Stressed vegetation noted around plant. Fluoride reported in foliage

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

Cattle eating foliage could get sick.

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Cattle and crops (groves across street)

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

Gypsum could be blown in wind.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☑ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Fluoride found in foliage.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None observed.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Everything is permitted.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

Emission of fumes and particles from stacks.

III. TOTAL POPULATION POTENTIALLY AFFECTED: ______

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

File and interview. Site investigation.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D043055151

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

People use gw for potable source and irrigation.

01 ☐ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

From runoff through ditches or into wetlands.

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Pollution evident from material released from stacks.

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______ 04 NARRATIVE DESCRIPTION

No flammables.

01 ☐ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

From fumes. Airborne gypsum.
From trespassers – no fence on south.

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ______ (Acres) 04 NARRATIVE DESCRIPTION

From airborne material or spills.

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

From gw contamination.

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

From accidents.

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

From runoff, or carried by air or gw contamination.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D043055151

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
A. NPDES	unknown	3/87		One outfall used now
B. UIC				
C. AIR				
D. RCRA				
E. RCRA INTERIM STATUS				
F. SPCC PLAN				
G. STATE (Specify)				
H. LOCAL (Specify)				
I. OTHER (Specify)				
J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
A. SURFACE IMPOUNDMENT		
☑ B. PILES		
C. DRUMS, ABOVE GROUND		
D. TANK, ABOVE GROUND		
E. TANK, BELOW GROUND		
F. LANDFILL		
G. LANDFARM		
H. OPEN DUMP		
I. OTHER (Specify)		

04 TREATMENT (Check all that apply)
- A. INCENERATION
- B. UNDERGROUND INJECTION
- C. CHEMICAL/PHYSICAL
- D. BIOLOGICAL
- E. WASTE OIL PROCESSING
- F. SOLVENT RECOVERY
- ☑ G. OTHER RECYCLING/RECOVERY
- H. OTHER (Specify)

05 OTHER
- A. BUILDINGS ON SITE

plants

06 AREA OF SITE

670 (Acres)

07 COMMENTS

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

A. ADEQUATE, SECURE ☑ B. MODERATE C. INADEQUATE, POOR D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

a drainage ditch surrounds gypsum stacks.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: YES ☑ NO

02 COMMENTS

By foot on unfenced southern border

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Site investigation.
File material.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE: FL | 02 SITE NUMBER: D043055151

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A. ✓	B. ☐
NON-COMMUNITY	C. ☐	D. ✓

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. ☐	B. ☐	C. ☐
D. ✓	E. ☐	F. ☐

03 DISTANCE TO SITE

A. 1 (mi)
B. 50' (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

✓ A. ONLY SOURCE FOR DRINKING
☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)
✓ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available)
☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 1942 (Within 4mi)

03 DISTANCE TO NEAREST DRINKING WATER WELL 50' (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
4 (ft)	West	4 (ft)	(gpd)	☐ YES ✓ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

Most are shallow private wells. Resident toward the south obtain potable water from Manatee County (SW).

10 RECHARGE AREA		11 DISCHARGE AREA	
☐ YES ☐ NO	COMMENTS	☐ YES ☐ NO	COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

✓ A. RESERVOIR, RECREATION DRINKING WATER SOURCE
☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES
☐ C. COMMERCIAL, INDUSTRIAL
☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Bishop Harbor	☐	~2 (mi)
Tampa Bay	☐	2 (mi)
Little Manatee River	☐	5 (mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 251 NO. OF PERSONS	B. ~~221~~ 679 NO. OF PERSONS	C. 221 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION 50' (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE ~200

04 DISTANCE TO NEAREST OFF-SITE BUILDING 50' (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

agriculture, sparsely populated, Some heavy industry.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D043055151

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-?}$ – 10^{-8} cm/sec ☐ B. 10^{-4} – 10^{-6} cm/sec ☑ C. 10^{-4} – 10^{-3} cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm sec) ☐ B. RELATIVELY IMPERMEABLE (10^{-4} – 10^{-6} cm sec) ☑ C. RELATIVELY PERMEABLE (10^{-2} – 10^{-4} cm sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm sec)

03 DEPTH TO BEDROCK ______ (ft)

04 DEPTH OF CONTAMINATED SOIL ZONE ______ (ft)

05 SOIL pH ______

06 NET PRECIPITATION 4 (in)

07 ONE YEAR 24 HOUR RAINFALL 4 (in)

08 SLOPE

SITE SLOPE 0.1 % DIRECTION OF SITE SLOPE fairly flat TERRAIN AVERAGE SLOPE 0.1 %

09 FLOOD POTENTIAL

SITE IS IN 100 YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE A. onsite (mi) OTHER B. ______ (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species) 6.5 (mi)

ENDANGERED SPECIES: Florida manatee

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL A. 1 (mi)

RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES B. 2 (mi)

AGRICULTURAL LANDS PRIME AG LAND C. ______ (mi) AG LAND D. 100' (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Terrain is relatively flat. Highest point in area ~30 amsl

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Topo. File. Refs.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D043055151

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	10	SWOK, Broken Arrow, OK	
SURFACE WATER	9	Gulf South Environmental,	
WASTE	1	New Orleans, La.	
AIR		Skinner + Sherman,	
RUNOFF		Waltham, Mass.	
SPILL		SA3 for radiation -	
SOIL	23	National Air & Radiation -	
VEGETATION		Montgomery, Al	
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
Water	pH, conductivity, Temp
Sample	
	pH - near neutral (7.0) because
	of buffering from PO_4
	conductivity - high

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☑ GROUND ☑ AERIAL

02 IN CUSTODY OF NUS - EPA
(Name of organization or individual)

03 MAPS ☑ YES ☐ NO

04 LOCATION OF MAPS EPA

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

None

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Field book

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D043055151

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER
Royster Phosphates	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
P.O. Box 1329	

05 CITY	06 STATE	07 ZIP CODE
Palmetto	Fl	34220

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

PARENT COMPANY (If applicable)

08 NAME	09 D+B NUMBER

10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

12 CITY	13 STATE	14 ZIP CODE

08 NAME	09 D+B NUMBER

10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

12 CITY	13 STATE	14 ZIP CODE

08 NAME	09 D+B NUMBER

10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

12 CITY	13 STATE	14 ZIP CODE

08 NAME	09 D+B NUMBER

10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

IV. REALTY OWNER(S) (If applicable; list most recent first)

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Interview, Files.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D043055151

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME Same		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	
08 YEARS OF OPERATION	09 NAME OF OWNER		

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME		11 D+B NUMBER	
12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE	
14 CITY	15 STATE	16 ZIP CODE	

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)

01 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD		
01 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD		
01 NAME		02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE	
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD		

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

10 NAME		11 D+B NUMBER	
12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE	
14 CITY	15 STATE	16 ZIP CODE	
10 NAME		11 D+B NUMBER	
12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE	
14 CITY	15 STATE	16 ZIP CODE	
10 NAME		11 D+B NUMBER	
12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE	
14 CITY	15 STATE	16 ZIP CODE	

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D043055151

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE

N/A

III. OFF-SITE GENERATOR(S)

01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D043055151

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
No response activity noted.

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING SURFACE WATER DIVERSION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D043055151

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ T. BULK TANKAGE REPAIRED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ W. GAS CONTROL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ X. FIRE CONTROL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D043055501

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY ENFORCEMENT ACTION YES NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY ENFORCEMENT ACTION

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

APPENDIX

I. FEEDSTOCKS

CAS Number	Chemical Name
1. 7664-41-7	Ammonia
2. 7440-36-0	Antimony
3. 1309-64-4	Antimony Trioxide
4. 7440-38-2	Arsenic
5. 1327-53-3	Arsenic Trioxide
6. 21109-95-5	Barium Sulfide
7. 7726-95-6	Bromine
8. 106-99-0	Butadiene
9. 7440-43-9	Cadmium
10. 7782-50-5	Chlorine
11. 12737-27-8	Chromite
12. 7440-47-3	Chromium
13. 7440-48-4	Cobalt
14. 1317-38-0	Cupric Oxide
15. 7758-98-7	Cupric Sulfate
16. 1317-39-1	Cuprous Oxide
17. 74-85-1	Ethylene
18. 7647-01-0	Hydrochloric Acid
19. 7664-39-3	Hydrogen Fluoride
20. 1335-25-7	Lead Oxide
21. 7439-97-6	Mercury
22. 74-82-8	Methane
23. 91-20-3	Napthalene
24. 7440-02-0	Nickel
25. 7697-37-2	Nitric Acid
26. 7723-14-0	Phosphorus
27. 7778-50-9	Potassium Dichromate
28. 1310-58-3	Potassium Hydroxide
29. 115-07-1	Propylene
30. 10588-01-9	Sodium Dichromate
31. 1310-73-2	Sodium Hydroxide
32. 7646-78-8	Stannic Chloride
33. 7772-99-8	Stannous Chloride
34. 7664-93-9	Sulfuric Acid
35. 108-88-3	Toluene
36. 1330-20-7	Xylene
37. 7646-85-7	Zinc Chloride
38. 7733-02-0	Zinc Sulfate

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
1. 75-07-0	Acetaldehyde
2. 64-19-7	Acetic Acid
3. 108-24-7	Acetic Anhydride
4. 75-86-5	Acetone Cyanohydrin
5. 506-96-7	Acetyl Bromide
6. 75-36-5	Acetyl Chloride
7. 107-02-8	Acrolein
8. 107-13-1	Acrylonitrile
9. 124-04-9	Adipic Acid
10. 309-00-2	Aldrin
11. 10043-01-3	Aluminum Sulfate
12. 107-18-6	Allyl Alcohol
13. 107-05-1	Allyl Chloride
14. 7664-41-7	Ammonia
15. 631-61-8	Ammonium Acetate
16. 1863-63-4	Ammonium Benzoate
17. 1066-33-7	Ammonium Bicarbonate
18. 7789-09-5	Ammonium Bichromate
19. 1341-49-7	Ammonium Bifluoride
20. 10192-30-0	Ammonium Bisulfite
21. 1111-78-0	Ammonium Carbamate
22. 12125-02-9	Ammonium Chloride
23. 7788-98-9	Ammonium Chromate
24. 3012-65-5	Ammonium Citrate, Dibasic
25. 13826-83-0	Ammonium Fluoborate
26. 12125-01-8	Ammonium Fluoride
27. 1336-21-6	Ammonium Hydroxide
28. 6009-70-7	Ammonium Oxalate
29. 16919-19-0	Ammonium Silicofluoride
30. 7773-06-0	Ammonium Sulfamate
31. 12135-76-1	Ammonium Sulfide
32. 10196-04-0	Ammonium Sulfite
33. 14307-43-8	Ammonium Tartrate
34. 1762-95-4	Ammonium Thiocyanate
35. 7783-18-8	Ammonium Thiosulfate
36. 628-63-7	Amyl Acetate
37. 62-53-3	Aniline
38. 7647-18-9	Antimony Pentachloride
39. 7789-61-9	Antimony Tribromide
40. 10025-91-9	Antimony Trichloride
41. 7783-56-4	Antimony Trifluoride
42. 1309-64-4	Antimony Trioxide
43. 1303-32-8	Arsenic Disulfide
44. 1303-28-2	Arsenic Pentoxide
45. 7784-34-1	Arsenic Trichloride
46. 1327-53-3	Arsenic Trioxide
47. 1303-33-9	Arsenic Trisulfide
48. 542-62-1	Barium Cyanide
49. 71-43-2	Benzene
50. 65-85-0	Benzoic Acid
51. 100-47-0	Benzonitrile
52. 98-88-4	Benzoyl Chloride
53. 100-44-7	Benzyl Chloride
54. 7440-41-7	Beryllium
55. 7787-47-5	Beryllium Chloride
56. 7787-49-7	Beryllium Fluoride
57. 13597-99-4	Beryllium Nitrate
58. 123-86-4	Butyl Acetate
59. 84-74-2	n-Butyl Phthalate
60. 109-73-9	Butylamine
61. 107-92-6	Butyric Acid
62. 543-90-8	Cadimium Acetate
63. 7789-42-6	Cadmium Bromide
64. 10108-64-2	Cadmium Chloride
65. 7778-44-1	Calcium Arsenate
66. 52740-16-6	Calcium Arsenite
67. 75-20-7	Calcium Carbide
68. 13765-19-0	Calcium Chromate
69. 592-01-8	Calcium Cyanide
70. 26264-06-2	Calcium Dodecylbenzene Sulfonate
71. 7778-54-3	Calcium Hypochlorite
72. 133-06-2	Captan
73. 63-25-2	Carbaryl
74. 1563-66-2	Carbofuran
75. 75-15-0	Carbon Disulfide
76. 56-23-5	Carbon Tetrachloride
77. 57-74-9	Chlordane
78. 7782-50-5	Chlorine
79. 108-90-7	Chlorobenzene
80. 67-66-3	Chloroform
81. 7790-94-5	Chlorosulfonic Acid
82. 2921-88-2	Chlorpyrifos
83. 1066-30-4	Chromic Acetate
84. 7738-94-5	Chromic Acid
85. 10101-53-8	Chromic Sulfate
86. 10049-05-5	Chromous Chloride
87. 544-18-3	Cobaltous Formate
88. 14017-41-5	Cobaltous Sulfamate
89. 56-72-4	Coumaphos
90. 1319-77-3	Cresol
91. 4170-30-3	Crotonaldehyde
92. 142-71-2	Cupric Acetate
93. 12002-03-8	Cupric Acetoarsenite
94. 7447-39-4	Cupric Chloride
95. 3251-23-8	Cupric Nitrate
96. 5893-66-3	Cupric Oxalate
97. 7758-98-7	Cupric Sulfate
98. 10380-29-7	Cupric Sulfate Ammoniated
99. 815-82-7	Cupric Tartrate
100. 506-77-4	Cyanogen Chloride
101. 110-82-7	Cyclohexane
102. 94-75-7	2,4-D Acid
103. 94-11-1	2,4-D Esters
104. 50-29-3	DDT
105. 333-41-5	Diazinon
106. 1918-00-9	Dicamba
107. 1194-65-6	Dichlobenil
108. 117-80-6	Dichlone
109. 25321-22-6	Dichlorobenzene (all isomers)
110. 266-38-19-7	Dichloropropane (all isomers)
111. 26952-23-8	Dichloropropene (all isomers)
112. 8003-19-8	Dichloropropene-Dichloropropane Mixture
113. 75-99-0	2-2-Dichloropropionic Acid
114. 62-73-7	Dichlorvos
115. 60-57-1	Dieldrin
116. 109-89-7	Diethylamine
117. 124-40-3	Dimethylamine
118. 25154-54-5	Dinitrobenzene (all isomers)
119. 51-28-5	Dinitrophenol
120. 25321-14-6	Dinitrotoluene (all isomers)
121. 85-00-7	Diquat
122. 298-04-4	Disulfoton
123. 330-54-1	Diuron
124. 27176-87-0	Dodecylbenzenesulfonic Acid
125. 115-29-7	Endosulfan (all isomers)
126. 72-20-8	Endrin and Metabolites
127. 106-89-8	Epichlorohydrin
128. 563-12-2	Ethion
129. 100-41-4	Ethyl Benzene
130. 107-15-3	Ethylenediamine
131. 106-93-4	Ethylene Dibromide
132. 107-06-2	Ethylene Dichloride
133. 60-00-4	EDTA
134. 1185-57-5	Ferric Ammonium Citrate
135. 2944-67-4	Ferric Ammonium Oxalate
136. 7705-08-0	Ferric Chloride

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
137. 7783-50-8	Ferric Fluoride
138. 10421-48-4	Ferric Nitrate
139. 10028-22-5	Ferric Sulfate
140. 10045-89-3	Ferrous Ammonium Sulfate
141. 7758-94-3	Ferrous Chloride
142. 7720-78-7	Ferrous Sulfate
143. 206-44-0	Fluoranthene
144. 50-00-0	Formaldehyde
145. 64-18-6	Formic Acid
146. 110-17-8	Fumaric Acid
147. 98-01-1	Furfural
148. 86-50-0	Guthion
149. 76-44-8	Heptachlor
150. 118-74-1	Hexachlorobenzene
151. 87-68-3	Hexachlorobutadiene
152. 67-72-1	Hexachloroethane
153. 70-30-4	Hexachlorophene
154. 77-47-4	Hexachlorocyclopentadiene
155. 7647-01-0	Hydrochloric Acid (Hydrogen Chloride)
156. 7664-39-3	Hydrofluoric Acid (Hydrogen Fluoride)
157. 74-90-8	Hydrogen Cyanide
158. 7783-06-4	Hydrogen Sulfide
159. 78-79-5	Isoprene
160. 42504-46-1	Isopropanolamine Dodecylbenzenesulfonate
161. 115-32-2	Kelthane
162. 143-50-0	Kepone
163. 301-04-2	Lead Acetate
164. 3687-31-8	Lead Arsenate
165. 7758-95-4	Lead Chloride
166. 13814-96-5	Lead Fluoborate
167. 7783-46-2	Lead Fluoride
168. 10101-63-0	Lead Iodide
169. 18256-98-9	Lead Nitrate
170. 7428-48-0	Lead Stearate
171. 15739-80-7	Lead Sulfate
172. 1314-87-0	Lead Sulfide
173. 592-87-0	Lead Thiocyanate
174. 58-89-9	Lindane
175. 14307-35-8	Lithium Chromate
176. 121-75-5	Malthion
177. 110-16-7	Maleic Acid
178. 108-31-6	Maleic Anhydride
179. 2032-65-7	Mercaptodimethur
180. 592-04-1	Mercuric Cyanide
181. 10045-94-0	Mercuric Nitrate
182. 7783-35-9	Mercuric Sulfate
183. 592-85-8	Mercuric Thiocyanate
184. 10415-75-5	Mercurous Nitrate
185. 72-43-5	Methoxychlor
186. 74-93-1	Methyl Mercaptan
187. 80-62-6	Methyl Methacrylate
188. 298-00-0	Methyl Parathion
189. 7786-34-7	Mevinphos
190. 315-18-4	Mexacarbate
191. 75-04-7	Monoethylamine
192. 74-89-5	Monomethylamine
193. 300-76-5	Naled
194. 91-20-3	Naphthalene
195. 1338-24-5	Naphthenic Acid
196. 7440-02-0	Nickel
197. 15699-18-0	Nickel Ammonium Sulfate
198. 37211-05-5	Nickel Chloride
199. 12054-48-7	Nickel Hydroxide
200. 14216-75-2	Nickel Nitrate
201. 7786-81-4	Nickel Sulfate
202. 7697-37-2	Nitric Acid
203. 98-95-3	Nitrobenzene
204. 10102-44-0	Nitrogen Dioxide
205. 25154-55-6	Nitrophenol (all isomers)
206. 1321-12-6	Nitrotoluene
207. 30525-89-4	Paraformaldehyde
208. 56-38-2	Parathion
209. 608-93-5	Pentachlorobenzene
210. 87-86-5	Pentachlorophenol
211. 85-01-8	Phenanthrene
212. 108-95-2	Phenol
213. 75-44-5	Phosgene
214. 7664-38-2	Phosphoric Acid
215. 7723-14-0	Phosphorus
216. 10025-87-3	Phosphorus Oxychloride
217. 1314-80-3	Phosphorus Pentasulfide
218. 7719-12-2	Phosphorus Trichloride
219. 7784-41-0	Potassium Arsenate
220. 10124-50-2	Potassium Arsenite
221. 7778-50-9	Potassium Bichromate
222. 7789-00-6	Potassium Chromate
223. 7722-64-7	Potassium Permanganate
224. 2312-35-8	Propargite
225. 79-09-4	Propionic Acid
226. 123-62-6	Propionic Anhydride
227. 1336-36-3	Polychlorinated Biphenyls
228. 151-50-8	Potassium Cyanide
229. 1310-58-3	Potassium Hydroxide
230. 75-56-9	Propylene Oxide
231. 121-29-9	Pyrethrins
232. 91-22-5	Quinoline
233. 108-46-3	Resorcinol
234. 7446-08-4	Selenium Oxide
235. 7761-88-8	Silver Nitrate
236. 7631-89-2	Sodium Arsenate
237. 7784-46-5	Sodium Arsenite
238. 10588-01-9	Sodium Bichromate
239. 1333-83-1	Sodium Bifluoride
240. 7631-90-5	Sodium Bisulfite
241. 7775-11-3	Sodium Chromate
242. 143-33-9	Sodium Cyanide
243. 25155-30-0	Sodium Dodecylbenzene Sulfonate
244. 7681-49-4	Sodium Fluoride
245. 16721-80-5	Sodium Hydrosulfide
246. 1310-73-2	Sodium Hydroxide
247. 7681-52-9	Sodium Hypochlorite
248. 124-41-4	Sodium Methylate
249. 7632-00-0	Sodium Nitrate
250. 7558-79-4	Sodium Phosphate, Dibasic
251. 7601-54-9	Sodium Phosphate, Tribasic
252. 10102-18-8	Sodium Selenite
253. 7789-06-2	Strontium Chromate
254. 57-24-9	Strychnine and Salts
255. 100-420-5	Styrene
256. 12771-08-3	Sulfur Monochloride
257. 7664-93-9	Sulfuric Acid
258. 93-76-5	2,4,5-T Acid
259. 2008-46-0	2,4,5-T Amines
260. 93-79-8	2,4,5-T Esters
261. 13560-99-1	2,4,5-T Salts
262. 93-72-1	2,4,5-TP Acid
263. 32534-95-5	2,4,5-TP Acid Esters
264. 72-54-8	TDE
265. 95-94-3	Tetrachlorobenzene
266. 127-18-4	Tetrachloroethane
267. 78-00-2	Tetraethyl Lead
268. 107-49-3	Tetraethyl Pyrophosphate
269. 7446-18-6	Thallium (I) Sulfate
270. 108-88-3	Toluene
271. 8001-35-2	Toxaphene
272. 12002-48-1	Trichlorobenzene (all isomers)
273. 52-68-6	Trichlorfon
274. 25323-89-1	Trichloroethane (all isomers)
275. 79-01-6	Trichloroethylene
276. 25167-82-2	Trichlorophenol (all isomers)
277. 27323-41-7	Triethanolamine Dodecylbenzenesulfonate
278. 121-44-8	Triethylamine
279. 75-50-3	Trimethylamine
280. 541-09-3	Uranyl Acetate
281. 10102-06-4	Uranyl Nitrate
282. 1314-62-1	Vanadium Pentoxide
283. 27774-13-6	Vanadyl Sulfate
284. 108-05-4	Vinyl Acetate
285. 75-35-4	Vinylidene Chloride
286. 1300-71-6	Xylenol
287. 557-34-6	Zinc Acetate
288. 52628-25-8	Zinc Ammonium Chloride
289. 1332-07-6	Zinc Borate
290. 7699-45-8	Zinc Bromide
291. 3486-35-9	Zinc Carbonate
292. 7646-85-7	Zinc Chloride
293. 557-21-1	Zinc Cyanide
294. 7783-49-3	Zinc Fluoride
295. 557-41-5	Zinc Formate
296. 7779-86-4	Zinc Hydrosulfite
297. 7779-88-6	Zinc Nitrate
298. 127-82-2	Zinc Phenolsulfonate
299. 1314-84-7	Zinc Phosphide
300. 16871-71-9	Zinc Silicofluoride
301. 7733-02-0	Zinc Sulfate
302. 13746-89-9	Zirconium Nitrate
303. 16923-95-8	Zirconium Potassium Fluoride
304. 14644-61-2	Zirconium Sulfate
305. 10026-11-6	Zirconium Tetrachloride

REFERENCE # 1

GYPSUM STACK STATUS

SOUTHWEST DISTRICT

NOVEMBER 1988

DISCUSSION

As a result of the extraction of phosphate from ore, gypsum (hydrated calcium sulfate) is produced as a byproduct. The gypsum is pumped as a slurry with plant process water to the tops of gypsum stacks for disposal. The plant process water is typically characterized as having a very low pH and high concentrations of arsenic, cadmium, chromium, lead, sodium, fluoride, manganese, iron, sulfate and total dissolved solids (TDS). High levels of radioactive particle emissions are also typical for the plant process water.

Unless the gypsum stack and associated process water cooling pond are underlain by an impervious liner, contaminants are discharged to groundwater. Soils underlying the gypsum stack/cooling pond complexes will have a variable capacity to neutralize the low pH causing a number of the contaminants to precipitate from solution and attenuating the propogation of such contaminants in groundwater.

Of the 15 gypsum stack/cooling pond complexes in the Southwest District, 11 continue phosphate fertilizer production and associated gypsum disposal activities. Four of the 11 active facilities have recently submitted applications to expand their gypsum disposal operations.

With the exception of Gardinier, all gypsum stack facilities were issued permits for groundwater monitoring in September, 1985. The permittees collectively objected to language in their permits which restricted their zones of discharge to the surficial aquifer, and the permits were therefore withdrawn. All permits for groundwater monitoring were reissued in early 1986 except those for C.F. Industries, Central Phosphates, Conserv and Agrico Chemical Company. These facilities had groundwater contamination problems which they wished to resolve prior to applying for a second groundwater monitoring permit. Agrico Chemical Company was issued a permit for groundwater monitoring early in 1987 which provided for an extended zone of discharge. Twelve of the 15 facilities therefore have permits for groundwater monitoring.

All gypsum stack/cooling pond complexes routinely monitor proximal groundwater quality pursuant to approved groundwater monitoring plans. All 15 facilities are "Existing Installations" and are therefore not required to meet secondary drinking water standards at their property boundaries or within the Intermediate or Floridan aquifers unless surface waters or potable wells may be affected.

FACILITY OVERVIEW

C.F. Industries

The facility includes sulfuric acid plants, phosphoric acid plants, diammonium phosphate plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Bartow in Polk County. Operations began at the facility in 1962 and gypsum disposal ceased for a time between 1986 and 1988. Gypsum disposal activities continue at about 25% of plant capacity.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in January, 1984. A permit for groundwater monitoring was issued to C.F. Industries on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A groundwater monitoring permit has never been reissued for this facility. As a result of groundwater violations, C.F. Industries filed a petition for an extended zone of discharge on December 31, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
arsenic	1.8 mg/L	.05 mg/L
cadmium	.51 mg/L	.01 mg/L
chromium	2.8 mg/L	.05 mg/L
sodium	2100 mg/L	160 mg/L
gross alpha	5480 pCi/L	15 pCi/L
combined radium	8.9 pCi/L	5 pCi/L
fluoride	4690 mg/L	2 mg/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
pH	1.5 SU	>6.5 SU
sulfate	4570 mg/L	250 mg/L

A Warning Notice was issued to C.F. Industries during July, 1985 for groundwater quality violations. The issues raised in the Warning Notice were to be resolved by an extended zone of discharge onto adjacent property, however a determination as to the extended zone of discharge is pending the collection of additional data.

Central Phosphates

The facility includes sulfuric acid plants, phosphoric acid plants, granulated triple superphosphate plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Plant City in Hillsborough County. Operations began at the facility in 1965 and expanded in 1975.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in February, 1984. A permit for groundwater monitoring was issued to Central Phosphates on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A groundwater monitoring permit has never been reissued for this facility. An application for an expanded gypsum stack/cooling pond complex was submitted by Central Phosphates on January 19, 1988 and withdrawn on November 4, 1988.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
Cadmium	.022 mg/L	.01 mg/L
chromium	.052 mg/L	.05 mg/L
lead	.09 mg/L	.05 mg/L
sodium	1250 mg/L	160 mg/L
gross alpha	29 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
manganese	12 mg/L	.05 mg/L
sulfate	5500 mg/L	250 mg/L
iron	260 mg/L	.3 mg/L
TDS	10,000 mg/L	500 mg/L

A Warning Notice was issued to Central Phosphates during July, 1985 for groundwater quality violations and a Consent Order was executed in September, 1987. Groundwater problems are now known to occur within the Floridan aquifer beyond the facility property boundary as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	415 mg/L	160 mg/L
gross alpha	29.4 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	2230 mg/L	250 mg/L
iron	30 mg/L	.3 mg/L
TDS	3700 mg/L	500 mg/L
pH	6.37 SU	>6.5 SU

Conserv

The facility includes a sulfuric acid plant, a phosphoric acid plant a diammonium phosphate plant and a gypsum stack/cooling pond complex on approximately 800 acres near Nichols in Polk County. Operations began at the facility in 1953 and expanded in 1962.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in February, 1984. A permit for groundwater monitoring was issued to Conserv on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A groundwater monitoring permit has never been reissued for this facility. An application for an expanded gypsum stack/cooling pond complex was submitted by Conserv on February 16, 1988. It is anticipated that the application for an expansion permit will be withdrawn by Conserv.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
arsenic	.15 mg/L	.05 mg/L
chromium	.22 mg/L	.05 mg/L
sodium	630 mg/L	160 mg/L
gross alpha	50 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	3620 mg/L	250 mg/L
iron	110 mg/L	.3 mg/L
manganese	3.4 mg/L	.05 mg/L
pH	4.3 SU	>6.5 SU
TDS	8760 mg/L	500 mg/L

A Warning Notice was issued to Conserv in June, 1985 for groundwater quality violations. The issues raised in the Warning Notice are to be resolved by execution of an acceptable Consent Order.

Farmland Industries

The facility includes phosphoric acid plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Bartow in Polk County. Operations began at the facility in 1965 and expanded in 1971.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in February, 1984. A permit for groundwater monitoring was issued to Farmland on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on January 31, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
chromium	.066 mg/L	.05 mg/L
sodium	1064 mg/L	160 mg/L
gross alpha	111.9 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
iron	30 mg/L	.3 mg/L
manganese	.38 mg/L	.05 mg/L
TDS	11,000 mg/L	500 mg/L
sulfate	3500 mg/L	250 mg/L

A Warning Notice was issued to Farmland during October, 1987 for groundwater quality violations. A proposed Consent Order is to be issued to Farmland by December, 1988.

Gardinier

The facility includes sulfuric acid plants, phosphoric acid plants, triple superphosphate plants, ammonium phosphate plants and a gypsum stack/cooling pond complex on approximately 2600 acres near Gibsonton in Hillsborough county. Operations began at the facility in 1924 and closure of the existing facility is anticipated by 1990 as construction of a new facility on separate property has recently been permitted.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in January, 1984. A permit for groundwater monitoring was issued to Gardinier on May 19, 1986.

The Department filed a complaint against Gardinier in June, 1988 to address environmental impacts associated with an acid spill which occurred in May, 1988.

Agrico Chemical Company

The facility includes sulfuric acid plants, phosphoric acid plants, a granulated triple superphosphate plant and a gypsum stack/cooling pond complex on approximately 2200 acres near Fort Meade in Polk County. Operations began at the facility in 1955.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in January, 1984. A permit for groundwater monitoring was issued to Agrico on September 10, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on January 30, 1987 which provided for an extended zone of discharge onto adjacent property.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
arsenic	.26 mg/L	.05 mg/L
sodium	1146 mg/L	160 mg/L
gross alpha	152.4 pCi/L	15 pCi/L
combined radium	34.2 pCi/L	5 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	2900 mg/L	250 mg/L
TDS	7046 mg/L	500 mg/L

A Warning Notice was issued to Agrico during July, 1985 for groundwater quality violations. The issues raised in the Warning Notice were resolved by extending the facility zone of discharge onto adjacent property.

American Cyanamid

The facility included a sulfuric acid plant, a phosphoric acid plant, a triple superphosphate plant and a gypsum stack/cooling pond complex on approximately 300 acres near Fort Meade in Polk County. Operations began at the facility in 1957 and ceased in 1971.

A groundwater monitoring plan was submitted to the Department in September, 1983 and approved in March, 1984. A permit for groundwater monitoring was issued to American Cyanamid on June 8, 1984 and subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on April 30, 1986.

Eleven of the 15 gypsum stack/cooling pond complexes are reportedly violating primary drinking water standards within the surficial aquifer at their property boundaries, and/or within the Intermediate or Florida aquifers. Groundwater quality investigations at 6 of these 11 facilities are currently being conducted through various enforcement mechanisms. As mentioned previously, groundwater quality violations at the Agrico Chemical facility have been addressed by modifying their groundwater monitoring permit to provide for an extended zone of discharge onto adjacent property.

All 15 gypsum stack/cooling pond complexes may be expected to leach contaminants to groundwater for a period of 50 years or more following the cessation of gypsum disposal activities. Appropriate site closure may help to minimize the spread of contaminants to proximal groundwater or surface water. Innovative uses of the remaining gypsum such as incorporation into building materials or road bed materials may also be encouraged during site closure.

Solid waste statutes which became effective October 1, 1988 require that all facilities disposing of their own solid waste on their own property after that date address groundwater discharges through an appropriate permit. The extent to which other solid waste rules, such as those requiring impervious liners, site closure and financial assurance, may apply to gypsum stacks is unclear.

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	2615 mg/L	250 mg/L
TDS	8144 mg/L	500 mg/L
iron	21.8 mg/L	.3 mg/L
manganese	.46 mg/L	.05 mg/L
pH	6.1 SU	>6.5 SU

Royster, Piney Point ~~(formerly AMAX)~~

The facility includes sulfuric acid plants, phosphoric acid plants, ammoniated fertilizer plants and a gypsum stack/cooling pond complex on approximately 300 acres in Manatee County. Operations began at the facility in 1966 and expanded in 1978.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved sometime thereafter. A permit for groundwater monitoring was issued to AMAX on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on March 14, 1987, following the collection of additional information.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	180 mg/L	160 mg/L

Secondary Drinking Water Standards

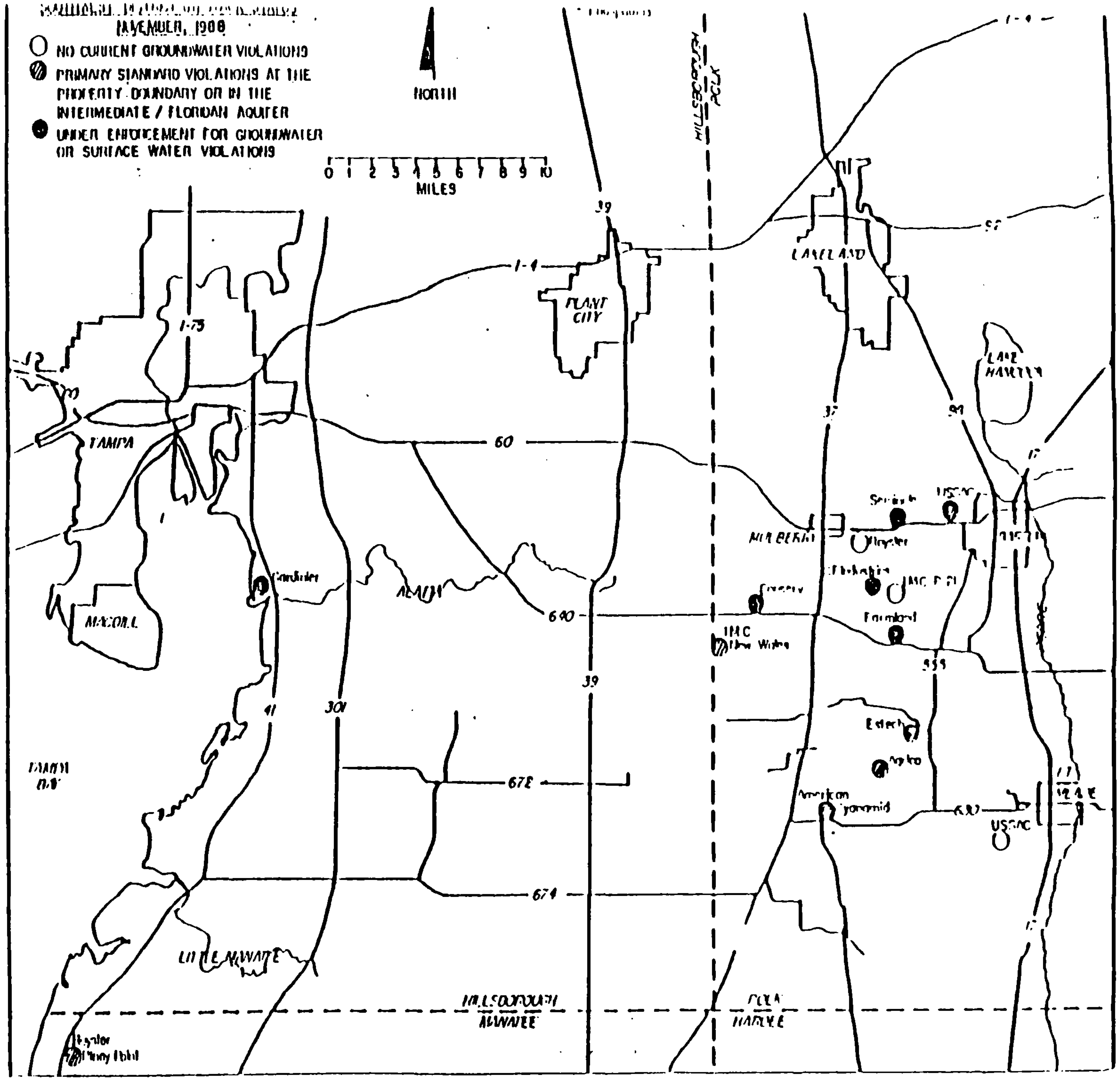
Contaminant	Concentration	Standard
sulfate	745 mg/L	250 mg/L
TDS	1586 mg/L	500 mg/L
manganese	.31 mg/L	.05 mg/L
iron	2.9 mg/L	.3 mg/L

Whether contaminants reported at Royster, Piney Point may be attributed to proximity to Tampa Bay is unclear.

Seminole Fertilizer (formerly W.R. Grace)

The facility includes sulfuric acid plants, granulated triple superphosphate plants, phosphoric acid plants, diammonium phosphate plants and two gypsum stack/cooling pond complexes on approximately 2000 acres near Bartow in Polk County. One gypsum stack/cooling pond complex is located north of SR 60 adjacent to the fertilizer plant, and the other gypsum stack/cooling pond complex is located south of SR 60. Operations at the north gypsum stack began in 1954 and operations at the south gypsum stack began in 1965.

Facility Name	Active	Inactive	Intermediate or Floridan Aquifer		Surficial Aquifer		Enforcement Action Initiated	Potable Wells Within 1/2 Mile	Expansion Permit Applications		Extended Zone of Discharge
			Primary and Secondary Violations	Secondary Violations Only	Primary and Secondary Violations	Secondary Violations Only			Issued	Withdrawn	
C.F. Industries	X				X		X				
Central Phosphates	X		X		X		X	X		X	
Conserv	X				X		X	X			
Farmland Industries	X				X		X	X			
Gardinier	X						X				
Agrico Chemical	X				X		X				X
American Cyanamid		X			X						
IMC New Wales	X		X								
Royster, Piney Point	X				X						
Seminole Fertilizer	X		X		X		X	X			
USSAC, Bartow		X			X			X			
USSAC, Fort Meade	X					X		X			
Estech		X			X						
IMC P-21		X				X					
Royster, Mulberry	X					X			X		


NO CURRENT GROUNDWATER VIOLATIONS
PRIMARY STANDARD VIOLATIONS AT THE PROPERTY BOUNDARY OR IN THE INTERMEDIATE / FLORIDAN AQUIFER
UNDER ENFORCEMENT FOR GROUNDWATER OR SURFACE WATER VIOLATIONS
NORTH
0 1 2 3 4 5 6 7 8 9 10
MILES
HILLSBOROUGH
POLK
LAKELAND
PLANT CITY
TAMPA
MACDILL
LAKE HAMILTON
MULBERRY
ALAFIA
LITTLE MANATEE
TAMPA BAY
HILLSBOROUGH
MANATEE
POLK
HARDEE
Gardinier
Seminole
USSAC
Royster
IMC
New Wales
Farmland
Estech
Agrico
American Cyanamid
USSAC
Piney Point
I-4
I-75
60
640
39
301
41
37
98
672
674
555
630
17

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved sometime thereafter. A permit for groundwater monitoring was issued to W.R. Grace on September 10, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued to W.R. Grace on April 15, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	759 mg/L	160 mg/L
gross alpha	80 pCi/L	15 pCi/L
combined radium	14.4 pCi/L	5 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	2012 mg/L	250 mg/L
TDS	4284 mg/L	500 mg/L
iron	245 mg/L	.3 mg/L
manganese	.25 mg/L	.05 mg/L

A Warning Notice was issued to W.R. Grace on March 3, 1988 for violations of groundwater quality standards. Subsequently, contaminants were discovered in nearby potable wells as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
arsenic	.075 mg/L	.05 mg/L
lead	.181 mg/L	.05 mg/L
sodium	176.7 mg/L	160 mg/L
gross alpha	59 pCi/L	15 pCi/L
combined radium	18.8 pCi/L	5 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	606 mg/L	250 mg/L
TDS	831 mg/L	500 mg/L
iron	29.6 mg/L	.3 mg/L

The potable wells have recently been replaced with city water, and a proposed Consent Order is to be issued to W.R. Grace by December, 1988.

USSAC, Bartow

The facility includes a sulfuric acid plant, a phosphoric acid plant, a diammonium phosphate plant and a gypsum stack/cooling pond complex on approximately 1000 acres near Bartow in Polk county. Operations began at the facility in 1946 and ceased in 1981.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved sometime thereafter. A permit for groundwater monitoring was issued to USS Agrichemical on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on June 19, 1986.

Groundwater quality problems have been reported in the surficial aquifer as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	245 mg/L	160 mg/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	1332 mg/L	250 mg/L
TDS	3131 mg/L	500 mg/L
manganese	.59 mg/L	.05 mg/L

USSAC Fort Meade

The facility includes sulfuric acid plants, phosphoric acid plants, triple superphosphate plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Fort Meade in Polk County. Operations at the facility began in 1961.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved sometime thereafter. A permit for groundwater monitoring was issued to USS Agrichemical on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on July 14, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
iron	11.4 mg/L	.3 mg/L
manganese	.12 mg/L	.05 mg/L

Estech

The facility began operation in 1948 and ceased operation in 1968. Little information is available in Department files as to the nature of the facility operation.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in August, 1984. A permit for groundwater monitoring was issued to Estech on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on May 19, 1986.

Groundwater quality problems have been reported in the Intermediate aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
gross alpha	26.2 pCi/L	15 pCi/L
combined radium	13.6 pCi/L	5 pCi/L

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	441 mg/L	160 mg/L
gross alpha	54.1 pCi/L	15 pCi/L
combined radium	14.3 pCi/L	5 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	1860 mg/L	250 mg/L
TDS	3300 mg/L	500 mg/L
iron	18 mg/L	.3 mg/L
manganese	1.1 mg/L	.05 mg/L

IMC P-21

The facility was in operation during the late 1950s and early 1960s, and little information is available as to the nature of past operations.

A groundwater monitoring plan was submitted to the Department in March, 1985 and was approved in May, 1985. A permit for groundwater monitoring was issued to IMC on September 11, 1985, and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on March 11, 1986.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	1431 mg/L	250 mg/L
TDS	2175 mg/L	500 mg/L
iron	125.4 mg/L	.3 mg/L
manganese	.78 mg/L	.05 mg/L

Royster, Mulberry

The facility includes sulfuric acid plants, phosphoric acid plants and a gypsum stack/cooling pond complex on approximately 1000 acres near Mulberry in Polk County. No records are available as to when operations began at the facility.

A groundwater monitoring plan was submitted to the Department in December, 1983 and was approved in January, 1984. A permit for groundwater monitoring was issued to Royster on September 11, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on July 9, 1986. An application for a construction permit to expand the gypsum stack/cooling pond complex was submitted to the Department in April, 1987, and a construction permit for the expansion was issued to Royster in March, 1988.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
iron	5.9 mg/L	.3 mg/L
pH	5.8 SU	>6.5 SU

No problems have been reported for the Intermediate aquifer monitor wells, however the well completion reports indicate that the Intermediate aquifer monitor wells are in fact completed in the Florida aquifer. Thus no monitor wells have been installed so as to monitor groundwater quality in the Intermediate aquifer.

Groundwater quality problems have been reported in the surficial aquifer at the site as follows:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	258.9 mg/L	160 mg/L
gross alpha	30.3 pCi/L	15 pCi/L

Secondary Drinking Water Standards

Contaminant	Concentration	Standard
sulfate	1424 mg/L	250 mg/L
TDS	4292 mg/L	500 mg/L
iron	45.6 mg/L	.3 mg/L
manganese	1.36 mg/L	.05 mg/L

Enforcement action has not been initiated against American Cyanamid.

IMC New Wales

The facility includes sulfuric acid plants, phosphoric acid plants granulated triple superphosphate plants and a gypsum stack/cooling pond complex on approximately 1600 acres near Nichols in Polk County. Operations began at the facility in 1975.

A groundwater monitoring plan was submitted to the Department in September, 1983 and was approved in February, 1984. A permit for groundwater monitoring was issued to IMC on September 9, 1985 and was subsequently withdrawn on October 23, 1985. A second permit for groundwater monitoring was issued on March 19, 1986. An application for an expanded gypsum stack/cooling pond complex was submitted by IMC on August 31, 1988.

No groundwater problems have been reported in the surficial aquifer at the facility property boundary. The following groundwater problems have been reported for the Intermediate aquifer, however the appropriateness of the monitor well construction is in question:

Primary Drinking Water Standards

Contaminant	Concentration	Standard
sodium	1030 mg/L	160 mg/L
gross alpha	20 pCi/L	15 pCi/L
combined radium	15.2 pCi/L	5 pCi/L

REFERENCE # 2

CONSOLIDAı ɛᴅ ɪᴠɪ...

FEED SUPPLEMENT DIVISION

September 16, 1987

Mr. Sam Sahebzamamni, P.E.
Industrial Waste Programs
Department of Environmental Regulations
4520 Oak Fair Boulevard
Tampa, Florida 33610-7347

Dear Mr. Sahebzamani:

In accordance with the terms of Permit I041-129068A, we are tran herewith the third quarterly report for 1987 of the groundwater wells at Piney Point. All the wells exceed the MCL for severa secondary parameters. With exception of well no. 6, the MCI primary parameters were generally not exceeded.

As pointed out in the letter transmitting the report in Jun is an apparent contamination problem with well MW-6, several p have high values. To repeat - this well is 65 feet deep, cas feet. The casing may have a break causing contamination. is located very close to a deep seepage ditch which could have on the results experienced. We again propose that MW-6 be plugged and that another location be selected to monitor the int aquifer.

As mentioned previously, we are anxious to pursue a solution your concurrence to select a different site for a new MW-6 look forward to your reply.

Yours very truly,

John G. Cladakis

John G. Cladakis
Senior Vice President an
Operations Manager
Piney Point Complex

mp

cc: Mr. W. L. Priesmeyer
Mr. B. V. Galloway
Mr. B. Harrison

P.O. Box 790 • Plant City, Florida 34289-0790 • Phone (813) 752

PARAMETER MONITORING REPORT
(Rule 17-3.402, 17-3.404 - 17-3.406)

MS # 4041A13768 | Sample Date 7/29/8

Monitoring Well # 4 | Well Type: [ ] Backg [ ] Site [ ] Inter [ ] Compl (x) Surf

Well Name MW-4

Classification of Groundwater G-II

Well Developed* Prior to Sample Collection (Yes/No) YES

Water Level from Top of Pipe

PRIMARY STANDARDS

STORET Code	Parameter Monitored	Sampling Method	Analysis Method	Analysis Result	Units	Sample Filtered/Unfiltered
	Arsenic	(1)	(2)	< .01	mg/l	unfiltered
	Cadmium	(1)	(2)	.00	mg/l	unfiltered
	Chromium	(1)	(2)	.02	mg/l	unfiltered
	Lead	(1)	(2)	.02	mg/l	unfiltered
	Nitrate (ASN)	(1)	(2)		mg/l	unfiltered
	Sodium	(1)	(2)	35.0	mg/l	unfiltered
	Fluoride	(1)	(2)	1.3	mg/l	unfiltered
	Gross Alpha	(1)	(2)	< 2.0	pCi/l	unfiltered
	R 226	(1)	(2)	N.R.	pCi/l	unfiltered
	Ra228	(1)	(2)	N.R.	pCi/l	unfiltered
	Secondary Standards					
	Chloride	(1)	(2)	57.0	mg/l	unfiltered
	Color	(1)	(2)	105.0	cl-pt	unfiltered
	Copper	(1)	(2)	.01	mg/l	unfiltered
	Iron	(1)	(2)	.60	mg/l	unfiltered
	Manganese	(1)	(2)	.06	mg/l	unfiltered
	pH	(1)	(2)	6.1		unfiltered
	Sulfate	(1)	(2)	162.0	mg/l	unfiltered
	TDS	(1)	(2)	726.0	mg/l	unfiltered
	Zinc	(1)	(2)	.01	mg/l	unfiltered
	Corrosivity	(1)	(2)	+1.3	Langelier	unfiltered
	Foaming agents	(1)	(2)	-	MBAS	unfiltered
	Odor	(1)	(2)	N.O.		unfiltered

*Well development is the process of pumping the well prior to sampling in order to ... representative ground water sample.

Form 17-1.216(2)
Effective January 1, 1983

N.R. = Not Required

Reference No. 3

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

For Routing To Other Than The A
To: Richard Garrity Location:
To: Sam Sahebzaman Location:
To: Location:
From: Al Bishop Date:

TO: Sam Sahebzamani
Southwest District

THROUGH: Richard Garrity
Southwest District

Richard Harvey
Division of Water Facilities

FROM: Al Bishop
Point Source Evaluation Section

DATE: September 28, 1988

OCT 0 5 1988
SOUTHWEST DISTRICT
TAMPA

SUBJECT: WQBEL for Royster Phosphate Piney Point Facility (formerly CM (Manatee County)

We were recently contacted by Mr. Ivan Nance of Royster Phosphates, Inc informed us that Royster had purchased the Consolidated Minerals, Inc. Piney Point facility. He said that he wanted to reinitiate the WQBEL L analysis for the Piney Point discharge because Royster would like to be permitted to discharge from outfall 003 at "normal" high flow condition had earlier terminated WQBEL development for the Piney Point discharge request of CMI who had agreed to a modification of their permit (I041-1 to only allow discharge following back to back 25 year storm events. I of the Level II analysis, we had recommended that the operating permit amended to require CMI to provide rainfall data from the Ruskin weather each time they reported a discharge from 003.

In light of Mr. Nance's request to reinitiate WQBEL development, we now recommend that the permit remain in effect without modification. As st in the permit, Royster is now proceeding with the WQBEL development pro should be allowed to discharge at the limits specified in the permit.

We have already been in contact with Royster's consultant, Conservation Consultants, Inc. (CCI), and have discussed at length both the data and modeling requirements for the WQBEL study. Daryll Joyner of my staff m site visit on September 7, 1988 to survey the receiving waters and to h with plan of study development. CCI is currently writing a draft plan for our review. We will provide you with a copy of the draft plan when available and will keep you apprised of all progress on the project.

If you have any questions or comments regarding the Level II analysis, call me or Daryll Joyner at Suncom 278-0780.

AB/DJ/cc

Sam what

REFERENCE # 4

"Rite in the Rain" WEATHERPROOF

LEVEL

NOTEBOOK NO. 311

F4-2582

AmAX Phosphate

TDD: F4-9009-01

Palmetto, Manatee County, Florida

P.M.: Maureen Gordon

LOGBOOK REQUIREMENTS
REVISED - NOVEMBER 29, 1988

NOTE: ALL LANGUAGE SHOULD BE FACTUAL AND OBJECTIVE

1. Record on front cover of the Logbook: TDD No., Site Name, Site Location, Project Manager.
2. All entries are made using ink. Draw a single line through errors. Initial and date corrections.
3. Statement of Work Plan, Study Plan, and Safety Plan discussion and distribution to field team with team members' signatures.
4. Record weather conditions and general site information.
5. Sign and date each page. Project Manager is to review and sign off on each logbook daily.
6. Document all calibration and pre-operational checks of equipment. Provide serial numbers of equipment used onsite.
7. Provide reference to Sampling Field Sheets for detailed sampling information.
8. Describe sampling locations <u>in detail</u> and document all changes from project planning documents.
9. Provide a site sketch with sample locations and photo locations.
10. Maintain photo log by completing the stamped information at the end of the logbook.
11. If no site representative is on hand to accept the receipt for samples, an entry to that effect must be placed in the logbook.
12. Record I.D. numbers of COC and receipt for sample forms used. Also record numbers of destroyed documents.
13. Complete SMO information in the space provided.

We the undersigned have received, read and understand the Study Plan, Health and Safety Plan and Work Plan for the Screening Site Inspection Phase II for AMAX Phosphate in Palmetto, Florida.

Maureen Gordon Maureen Gordon

Mark Adams MARK ADAMS

Terry Sawyer Terry Sawyer

ANDY SPAUGH [signature]

Ron Young [signature]

October 16, 1990

We arrived at AMAX at 810. It was sunny and 75°F.

I met with Mr. Ivan Nance. He informed me that drilling was not possible without a permit + Fl. licensed driller. We can hand-auger.

Hard hats and safety glasses are required in area of plant. He said that they would accept no liability for us.

Ivan Nance, Environmental Supervisor

M. Gerdes

10/16/90

"Effects of 3 phosphate Industrial Sites on G.W. Quality in Central Florida 1979 to 1980"
USGS
Water-Resources Invest. Report 83-4206

Fl. Dept Env. Reg
USEPA
R. Miller H. Sutcliffe, Jr.
Tal., Fl. 11984

Water Quality and Hydrogeologic Data for 3 PO4 Industry Waste Disposal Sites in Central Florida, 1979-80
USGS
Water Resource 81-84

Publications on PO4 file.
to copies.

M. Gerdes

3

4

10/16/90
Report to Congress on Special Waste from Mineral Processing

Summary and Findings
Methods and Analyses
Appendices

Solid Waste and Emergency Response
$16.00 $32.00
EPA/530-SW-90-070C
July 1990 PB-90-258-492
(703) 487-4650

40 CFR, Part 61, Subpart R
Natl. Emission Standard for Hazardous Air Pollutants (NESHAP)
Radon Emissions Standard ~~for Hazardous Air Pollutants~~ from Phosphogypsum Stacks
(54 FR 51654, Dec. 15, 1989)
FR 13480, Apr 19, 1990
Apr 19, 1990 -- 55 FR 13482

10/16/90
Potable Water source County. Employees 170.

Royster sold the to a joint venture company - closing by Nov. 1

Atlantic Fertilizer Co.
Joint venture with Gulf Atlantic and Royster. Royster will manage.

Ore is from Hillsborough County.

2500 Tons of H_2SO_4 used per day.

2000 tons of H_2SO_4/day all is used in house. Need to buy more.

M. [illegible]

5

10/16/90

$H_3PO_4 + NH_3 \rightarrow$

001, 003 are not used anymore. They are permitted but not used

001 — Sept. 1988 last time

003 — March 1984 last time

002 — Always used Non processing water.

~~Industrial Waste~~ Water File in Tampa. Public Access — where AMAX files are located.

M. Kosslo

10/16/90

Set up c. post in front of guardhouse outside of the gate.

915

Monitor four Background

22294 20. cpm, 0.02 mR/hr

HNu # 801667 423

Span	PPM	Probe
9.8	54	10.2

OVA standardized 980 with methane

69082 - Deca

serial 51001

pH meter # 690874

Std. 7.0, 4.0, 10.0

Royster Phosphates Inc
Phosphoric Product complex
Piney Point

M. Kosslo

17

10/16/90
Tour of facility
with Ilian Nahra
670 acres.

pH is checked
continually.

Acid storage tanks
around chemical
plant 6900 tons H2SO4
98.5% H_2SO_4
2300 tons/day used.

Most likely contam.
Heavy metals, Uranium.
Rock rock is granular
and dark brown
Gypsum is transported
in slurry. Some dissolved
metals from acid.
~~In ...~~
M-4 0.06 mR/hr
Reading at stack

M Gordon

10/16/90
Anhydrous NH_3 stored
outside in Pomeranite
tanks.

Alarms go off if
chemicals are released.
Fire Dept comes.

54% H_3PO_4
underground pipes
within chem plant area.

Underground cables
around power lines.

Process waters pH 1.8-2.0
Sprays onto Gypsum
Stack.

DHO pH 1.8-2.0

Cows outside fence
North side. Beef.

M Gordon

12/16/90
300 acres gypsum

Bee hives East of stack
tried a few trailers

#1 and #4 Background
2 5

Buckeye Rd.
Orange Grove - South

Fence Line property.

Trench drain empties
into ditch by old
stack (most south)

Port Manatee. Due
West.
GW - W or SW

Tidal surge hamst
to 41.

M. [illegible]

12/16/90
Trieste Turbine
Parts, jet engines,
West across 41

Zone - Heavy industrial
Agriculture

F in water kills
vegetation

Cooling water is
sprayed for evaps.

Water stored on tops
of stack for evap

Cement storage Eastern
on coast.

On gypsum - M-4 .08mR/hr

Ahh - no reading

M. [illegible]

12

10/16/90
About 30 drums
South of plant
Son concrete slab.

House west of plant
old man [illegible]
property. Phone disconnected

South side of property
not fenced. Rest chain
link, guardhouse.
001 and 003 to
ditch. To E-W. ditch
then south finally
to harbor. Drainage
from groves.
Lead Arsenate was
used in sprays at
one time in Groves.

[illegible]

10/16/90
MW data in logbook
FY-2583

Area N+S of Buckeye Rd
is farmland and swampy.
Looking for Curiosity Co.
Area that [illegible]
of AMAX - look for
creek. 1200
We reached Curiosity
Co. Manager of the
farm took us. He
pointed out that it is
flowing from AMAX
toward N, we
were on Hills/[illegible]
City border.

Temp. 85°, Sunny.

Swampy area surrounding
AMAX. Stream intermittent

[illegible]

10/16/90

Since need background not affected by facility, will go to River — even though not connected with drainage pathway, it is completely upgradient.

Cuyahoga Co. also flows into Cockrell, so Cockrell is also downgradient from AMAX.

About 1/3 trees in area of plant are dead.

Boats seen in all waterways. Many marinas in 2 counties.

M. Gordon

10/17/90

830 Sunny 75°F

Upon our arrival at the site, smoke was emitting from all of the stacks in the plant.

815

M-4 #689357
Bkgd 0.04 mR/hr

HNu SN 801663 DH 683205
9.8 span, 0-200
52 ppm with std

OVA SN 51001 DH 690822

pH meter ~~6981~~ #690814
Std. 7.0, 4.01, 9.98 - pH

M. Gordon

16 10/16/90

Code	Location	Comments	Time
AP-SW-01	Little Muddy R. North Bank East of Hwy 41	Minnows & Polywogs in the Channel	1330
AP-SD-01	Safford Park Dr. Riverside Trailer Park	[illegible] sandy/[illegible] channel	1330
AP-SD-02	Cabbage Slough Co. 1.5 mi SE of Hurley N side of SR 683 W of Hwy 75	Cocoa [illegible]	14[illegible]
AB-SD-02	~~[illegible]~~ "	Brown Mud	1420
AP-SS-01	Ax 70 yards on west side of [illegible] Airport Road. Took a Random Sample At this Location	[illegible]	15[illegible]
AP-SB-01	Same Location as AP-SS-01	Took [illegible] to [illegible] composite sample [illegible] [illegible] taken [illegible]	1535

M. [illegible] | M. [illegible] | 17

10/16/90

Codes	Location	Comments	Time
AP-TW-01	[illegible]	Well of [illegible] readings on OVA	1025
10/17/90		10/17/90	
AP-PW-01	Dan Quinn Rte 1 Box 398B Palmetta, Florida 34221	This well supplies three homes and a total of 10 peas. 920 925 930 Conductivity 1030 1070 1070 PH 7.2 7.33 7.33 Temp 25c 25c 24c Sample at 9:35	
AP-SS-02	Located at same place as AP-PW-01	Gray, black No readings on OVA	0925
AP-SB-02	Located at same place as AP-PW-01 & AP-SS-02	At [illegible] light brown sand [illegible] No readings on OVA	0945
AP-TW-02	Located at same place as AP-PW-01 & AP-SS-02 & AP-SB-02	Well apx 4 feet deep	[illegible] 1040

M. [illegible]

M. [illegible]

14

20

10/17/90

92°F Sunny [illegible]

Codes	Location	Comments	Time
AP-SW-11	Ammonia Removal Pond, from west end	[illegible] North of cooling pond [illegible]	14[illegible]
AP-SD-11	" "	Light gray, clay like	1[illegible]0
AP-SW-09	East End cooling pond.	[illegible] bank	1[illegible]15
AP-SD-01	" "	Banks rocky. [illegible] Foam on water. Eyes sting. Water from seepage ditch goes in	1[illegible]30

[illegible]

[illegible] 21

Wildlife Code	Location	Wildlife Comment	Time
AP-SW-03 and AP-SD-03	not NPDES discharges not in use. [illegible] at [illegible]	[illegible] [illegible] and [illegible] [illegible] not	
AP-SW-04	Conn. Backyard and Hwy 41 in drainage canal	Algae [illegible] [illegible] [illegible] tadpoles. [illegible] farmland small fish	1620
AP-SD-04	Since there is a fence SD was collected near the last location.	Brown Sand-Grouse [illegible] spot recollected	1630
AP-SW-05	Confluence of drainage ditch and Bishops Creek. RR runs parallel to	Drainage canal runs along a RR to Bishops Harbor. Pair Brown [illegible]	1645
AP-SD-05	ditch. Little spot on ditch side East of Northern Head.	Mallard, Green head [illegible] in water people fish [illegible] Creek [illegible]	1650

M. Goode

M. Goode

10/17/90

Ilene Name Took a around today also.

Reeder Farms
Reeder Ranch and Dairy
10608 U.S. 41 N
Palmetto, FL 34221

Wants test results.
Owns lots of land including airport, dairy, grove including land 4 trailers in SE corner of AMAX

M. Costa

[illegible]

Not [illegible] working

[illegible] 22
80 [illegible] CH4

See Newspaper, [illegible] specialist [illegible] etc.
[illegible] supervised [illegible] work for the day.

25

10/18/90

Code | Location
Reading | OVA - none
M-4 | 0.04 mR/hr
AP-SS-05 | West of cooling pond between ditch and rainwater pond. 25' from ditch. 40' East of Hwy 41
AP-SB-05 | OVA 6 ppm at 10'

AP-TW-05 | " "

HF is a by-product in sprayers on gypsum stack used - is not fenced. Chain link fence around borders only.

M Lasko

10/18/90

Comments | Time
| H...
Brown soil | 900
Water in ditch black, some foam.
Dead vegetation along ditch

| 910
Collected at zone of saturation 10' bls tan sand

Collected 10' bls | 920

M. Lasko | 217

28 10/16/00

Code	Location
AP-SS-04	SW corner of chemical plant outside of main building. In palm grove
AP-SB-04	
AP-TW-04	

M. [illegible]

10/16/00

Comment	Time
Live palm trees and dead hardwoods. Moved sample from directly west to [illegible] because of dead vegetation. Dark brown soil, dead trees also [illegible].	1020
Collected 4' b/s at zone of saturation. Clayey sand [illegible]	1030
Collected 4' b/s	1040

[illegible]

29

10/15/90

I spoke to Mr. [illegible]'s [illegible] at the airport office (Manatee Airport). They have had pollution problems from [illegible]. In the past the citrus trees [illegible] were contaminated with fluoride. Also grass was contaminated and had to graze cattle elsewhere. From time to time, salt content in soil is a problem for raising [illegible]. [illegible] results. Also [illegible] results from [illegible] and [illegible] to [illegible].

M [illegible]

10/16/90 [illegible]

[illegible] Manatee [illegible] [illegible] Manatee [illegible] [illegible] [illegible].

I met with [illegible] engineer [illegible] the water department. He gave me 2 sheets showing water coverage for my area.

[illegible]
315 7th St. W
[illegible], FL
(813) 745-3410
No coverage [illegible] of [illegible] and [illegible] R - [illegible] East of 41. These 2 [illegible] [illegible] [illegible] attached.

[illegible] Manatee [illegible] [illegible] Manatee [illegible].

M [illegible]

10/23/96
Detailed sampling information appears on Sample Information Sheet filed under TDD: F4-9005-01

The PRP decided not to split samples.

COC Forms:
No. 4 - 1464, 1472, 0210, 1490,
1471, 1488, 1487,
1489, 1486, 15962

Receipt for Sample forms.
Susanne Neupauer, UMAY
No. 4 - 0073, -0150
Reeder Ranch & Dairy,
Don Quinn No. 4 - 0151
Graham Reeder Airport
Manatee No. 4 - 0149

M. Goodo

10/23/96

Field Measurements

Sample	Date Oct, 96	Time	pH	Temp, °C	Cond. umho/cm
SW-01	16	1330	7.0	28.3	6510
SW-02	16	1415	7.2	30.0	1250
SW-04	17	1620	7.0	24.0	2540
SW-05	17	1645	7.1	28.0	13,200
SW-06	17	1440	8.5	30.0	1930
SW-07	17	1515	6.7	30.0	2390
SW-08	17	1605	6.1	28.0	1920
SW-09	17	1515	2.5	30.0	17,740
SW-11	17	1445	8.9	31.0	5720
TW-01	16	1625	6.7	27.0	707
TW-02	17	1040	6.5	28.0	180
TW-03	17	1145	6.7	28.0	3320
TW-04	18	1040	6.7	27.0	2870
TW-05	18	0930	6.4	26.0	3390
PW-01	17	0935	7.3	24.0	1070
MW-01	16	1130	6.7	22.0	980
MW-03	16	0900	6.8	26.0	4050
MW-04	16	1520	7.1	27.0	932
MW-05	16	1350	7.3	25.0	1570
MW-06	16	1615	7.4	27.0	745

33

Air Bill nos: 7414368463

52

SAS (Ra 226/228, Gross) 41

Nat'l. Air + Radiation 15

Case No. 15399 Environ, Mont, Al 26

Low Concentration 30

SWOK, ~~Broken~~ Arrow, 74

OK

Gulf South Environ Labs,
New Orleans

Airbill No.

Skinner + Sherman
Waltham, Mass.

40

41

REFERENCE # 5

STATE OF FLORI[illegible]

DEPARTMENT OF ENVIRONMEN[illegible]

SOUTHWEST DISTRICT

[illegible]

PERMITTEE:

Mr. John G. Cladakis
Senior Vice President
CONSOLIDATED MINERALS, INC.
Post Office Box 908
Palmetto, FL 33561

PERMIT/CERTIFICATION

ID Number: 4041P20001[illegible]
Permit No.: IO41-129068[illegible]
Expiration Date: May 11, 1990
County: Manatee
Latitude: 27° 37' 24"
Longitude: 82° 31' 54"
Project: Phosphatic Fertilizer Plant Wastewater Treatment and Discharge

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rules 17-3, 17-4 & 17-6. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the department and made a part hereof and specifically described as follows:

The facility consists of phosphoric acid, sulfuric acid and diammonium phosphate plants. Calcium sulfate, which is generated as a by-product in the phosphoric acid production process, is stored at the site. The calcium sulfate transport water and scrubber water from the phosphoric acid and diammonium phosphate plants make up the process wastewater. This stream is ponded and, to the extent possible, reused. Contaminated non-process wastewater is discharged through Outfalls 001 and 002 and the process water which cannot be recycled is treated and discharged through Outfall 003. Process wastewater treatment consists of double-liming and further steps for which confidentiality has been claimed in accordance with Section 403.111, Florida Statutes. Outfalls 001 and 003 discharge to Buckeye Road drainage ditch, which becomes confluent with a southerly flowing railroad drainage ditch, which ultimately discharges into Bishop Harbor, which flows into Tampa Bay. Outfall 002 discharges to a drainage ditch and thence to Piney Point Creek, which empties into Tampa Bay. The groundwater monitoring requirements of Section 17-4.245 of the Florida Administrative Code (F.A.C.) are addressed in this permit.

Location: Immediately east of U.S. Highway 41 and approximately six (6) miles north of Palmetto, Manatee County, Florida.

Replaces Permit No.: IT41-85866B

Mr. John G. Cladaki[illegible]
CONSOLIDATED MINERALS, INC.

File No. IO41-129068
Page 2

When the Order (Permit) is final, any party to the Order has the right to seek judicial review of the Order pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date the Final Order is filed with the Clerk of the Department.

Executed in Tampa, Florida.

Sincerely,

Henry B Dominick

Henry B. Dominick
Permitting Engineer
Industrial Waste Program

HBD/aa
Attachment: As stated

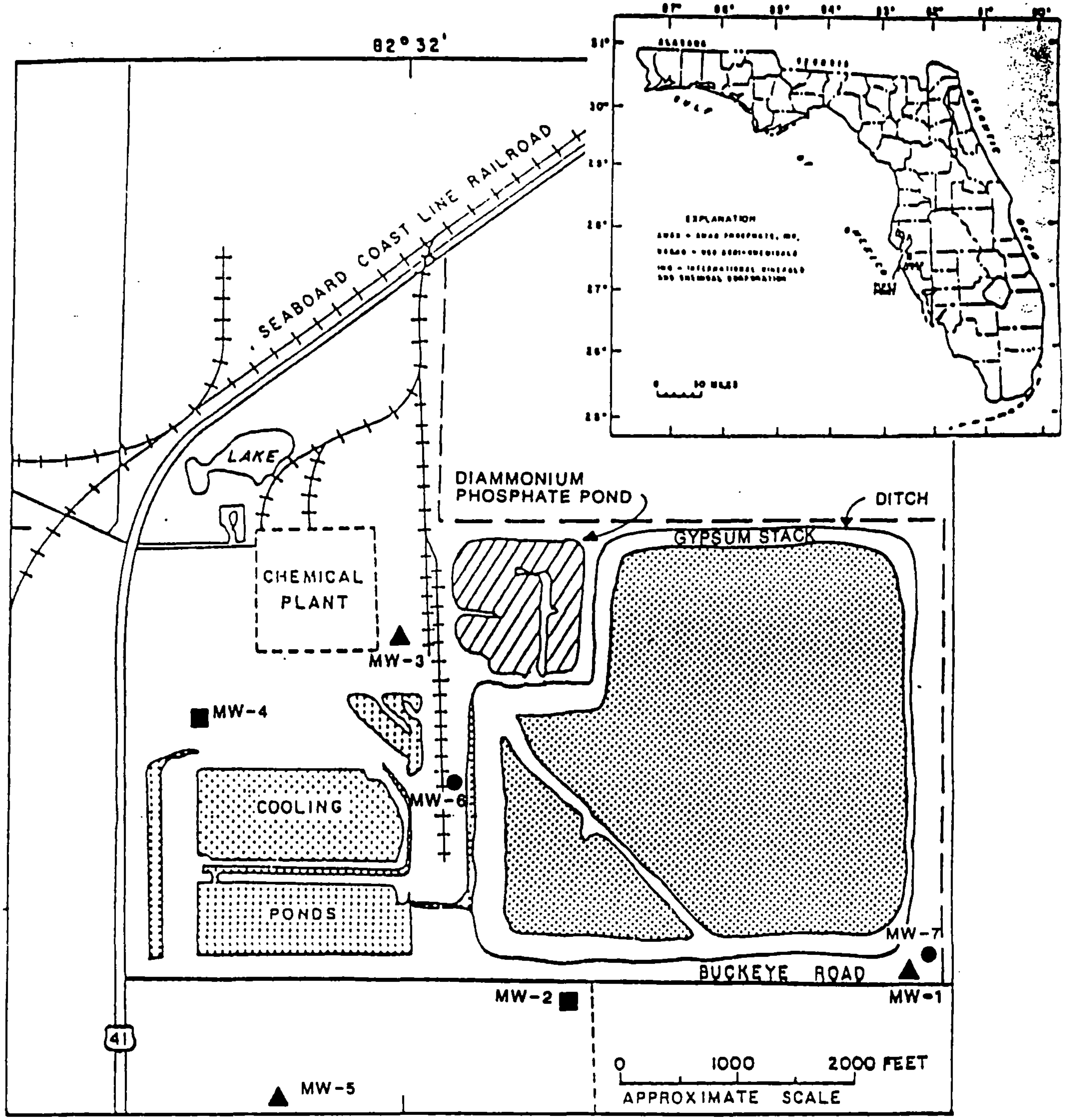
cc: W. L. Priesmeyer, MCHD
Southwest District Groundwater

CERTIFICATE OF SERVICE

This is to certify that this NOTICE OF PERMIT and all copies were mailed before the close of business on May 15, 1987 to the listed persons.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to Section 120.52(10), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Angela L. Andrey 05/15/87
Clerk Date



EXPLANATION

MW-1 ▲	NEWLY INSTALLED SURFICIAL AQUIFER MONITOR-WELL LOCATION AND NUMBER
MW-2 ■	EXISTING SURFICIAL AQUIFER MONITOR-WELL LOCATION AND NUMBER
MW-7 ●	EXISTING INTERMEDIATE AQUIFER MONITOR-WELL LOCATION AND NUMBER

AMAX CHEMIC.
A SUBSIDIARY OF AMA
P.O. BOX 908 • PALMETTO, FLORIDA

REFERENCE # 6

FEB 2 7 1987

SOUTH WEST DISTRICT
TAMPA

February 25, 1987

Dan
FYI
HD — We will soon have to send our comments to Tally — Sa 3/10

Mr. Dale Twachtmann
Secretary
Florida Department of
Environmental Regulation
Twin Towers Building
2600 Blair Stone Road
Tallahassee, FL 32301

RE: Request for Conductivity Variance
AMAX Chemical Corporation, Piney Point Complex
Industrial Wastewater Permit

Dear Mr. Twachtmann:

AMAX Chemical Corporation is currently operating its industrial wastewater system under temporary operating permit number IT41-85866 B which expires March 4, 1987. Application for an operating permit was filed on January 2, 1987. Included in the existing permit is a variance for specific conductivity, granted for Outfall 003 under DER File No. VE-41-181 which expires April 25, 1987. AMAX Chemical Corporation is hereby applying for a renewal for Specific Conductivity at Outfall 003.

AMAX's Piney Point Complex is located in the northwest section of Manatee County, approximately one-quarter mile inland from Tampa Bay. The Complex has three surface water outfalls; two are non-process discharges (001 and 002) and the third (003) discharges treated process water. One non-process outfall (002) flows northward into Cockroach Bay, a saltwater estuary, while the other non-process outfall (001) and the treated process water outfall (003) flow southward into the marine waters of Bishop Harbor.

The receiving water for the south surface outfalls (001 and 003) is a man-made roadside drainage ditch that flows initially westward for approximately 600 meters below the AMAX outfalls and turns south in a railroad drainage ditch for approximately 1900 meters where it enters Bishop Harbor. This salt water body is typical of Florida marine waters and has conductivity values well in excess of AMAX's effluent.

AMAX requests that the Department grant a variance from the requirements of 17-3.06(2)(o), Florida Administrative Code and 403.201, Florida Statutes, to allow the discharge of water with higher conductivity than allowed by the Water Quality Standards established for Class III waters of the State. Paragraph 17-3.061(2)(o) F.A.C. states: "Specific Conductance -- shall not be increased more than 100% above background levels or to a maximum level of 500 micromhos per centimeter in surface waters in which the specific conductance of the water at the surface is less than 500 micromhos per centimeter; and shall not be increased more than 50% above background level or to a maximum level of 5,000 micromhos per centimeter in surface waters in which the specific conductance of the water at the surface is equal to or greater than 500 micromhos per centimeter but less than 5,000 micromhos per centimeter."

The background specific conductance of the receiving water, based on an average of maximum values over the past eleven (11) months, is 1,468 micromhos per centimeter. The specific conductance of the treated process water discharge is approximately 4,400 (average) and 5,500 (maximum) micromhos per centimeter.

Approximately 2,500 meters downstream the receiving body mixes with the salt waters of Bishop Harbor. Although we have not performed recent studies on conductivity values in Bishop Harbor, it is a well known fact that salt water values are considerably higher than found in the AMAX discharge waters. Work carried out by the company in 1983 and 1984 found that specific conductance values in Bishop Harbor varied between 10,000 and 40,000 micromhos per centimeter approximately 2,500 meters downstream from the AMAX discharge. It is not believed that AMAX's discharge will significantly affect the naturally occurring high specific conductance values in Bishop Harbor. AMAX employs double-lime treatment and an ammonia removal process prior to discharging treated process water. There appears to be no economical method for further reducing the specific conductance of the treated process water effluent.

Anticipating additional questions AMAX offers the following 403.201 Florida Statute response:

1. We believe that this variance request is made pursuant to Chapter 403.201(1)(a) and (c). There is no practicable means known or available for adequate control of the pollution involved. As important, however, even if such means existed, is the fact that it would be impractical from both economic and environmental standpoints to reduce the specific conductance in the discharge to within allowable limits in the receiving body of water because within 2,500 meters, it enters Bishop Harbor where specific conductance values range from 10,000 to 40,000 micromhos per centimeter. The effluent flow route is described above. Thus, even if practicable water treatment technology becomes available to reduce the specific conductance of the effluent, no environmental improvement would result from the company installing such treatment technology.

   AMAX investigated water treatment alternatives to reduce the levels of conductivity in the treated process water discharge in 1984 which included ion-exchange, reverse osmosis, dilution and other treatment technologies. None of the technologies available could be practically applied. Additionally, current inquiries have revealed no breakthrough techniques. AMAX believes that this explanation supports the applicability of sub-paragraphs (a) and (c).

2. AMAX requests a long term variance (at least life of permit) supported by the following.

   a. This ditch/canal system used to transport the effluent from the NPDES outfalls to Bishop Harbor is not a natural system containing high levels of habitat diversity. These waterways were built to drain Buckeye Road, U.S. Highway 41, a railroad line, and agricultural fields used for pasture, sod growing, tomatoes, ornamentals and citrus. Flow upstream of AMAX's outfalls contains elevated levels of conductivity when irrigation runoff or rainfall triggers a flow event.

   b. No adverse effects will result in the Bishop Harbor ecosystem as a result of AMAX's effluent as it already contains naturally occurring elevated levels of specific conductance.

c. Current technology to reduce specific conductance levels in the effluent is not practicable. Even if such technology becomes available, the need to reduce specific conductance levels is not appropriate because AMAX's effluent contains insignificant levels when compared to water in Bishop Harbor.

3. What level of specific conductance can be met in the treated process water discharge?

Untreated process water has conductivity values of approximately 9,000 micromhos per centimeter. Double-lime treated process water typically contains less than 6,000 micromhos per centimeter. AMAX's experience utilizing its proprietary tertiary treatment system ranged from 3,700 to 5,500 micromhos per centimeter. During this entire period of data collection the production facilities have been shut down. Allowing for variation during normal operation continues to suggest a level of 6,000 micromhos per centimeter as a reasonable level of specific conductance.

Thus, we believe the variance should be issued authorizing the release of treated process water less than 6,000 micromhos per centimeter.

<u>17-103.100 Response:</u>

a. addressed above

b. addressed above

c. addressed above

d. addressed above

e. addressed above

f. and g. require a discussion of the social, economic and environmental impacts on the company, residents of the area and of the state if the variance is granted or if the variance is denied. The following addresses these issues:

Social Impacts: The ditch/canal system functions principally to drain land in support of agricultural, transportation, and manufacturing activities. Fishing and other recreational uses have not been observed by AMAX in the ditch system because most residents choose to do so either in larger freshwater streams where flow is continuous or in Bishop Harbor where no environmental impacts will be caused by issuance of the variance. Thus, AMAX cannot identify any significant social impacts upon area residents or the state caused by issuance of the variance.

Denial of the variance also would have limited potential impacts upon residents of the area and the state. As described above, denial of the variance would not result in an ecosystem capable of supporting commercial or recreational uses of the ditch/canal system which are not present currently. Because Bishop Harbor will not be impacted by Department action upon AMAX's request, denial of the variance would have no favorable social consequences upon residents of the area or the state.

Economic Impacts: The principle impact of the Department's decision is economic. Due to the environmental characteristics of the ditch/canal system and Bishop Harbor, a requirement to soften the effluent (should the variance be denied) will impose an unnecessary, multi-million dollar hardship on a facility that has not produced for economic reasons since January, 1985. Denial of the variance will not create an ecosystem capable of generating economic gains to offset AMAX's hardship.

Environmental Impacts: AMAX believes denial of the variance, independent of the question of available treatment technology, would not produce significant environmental benefits because the receiving ditch/canal system is man-made, intermittent, of low ecological diversity, and contains elevated conductivity values due to upstream activities as well as tidal effects in the ditch/canal.

Once AMAX's effluent reaches Bishop Harbor, approximately 2,500 meters downstream of AMAX's NPDES outfalls, no environmental benefits would accrue from denial of the variance because the marine waters of Bishop Harbor contain specific conductance levels far greater than AMAX's effluent. Thus, the environmental benefits of denial are limited to the 2,500 meters of ditch/canal system constructed to drain runoff from agricultural lands, highways, and a railroad. It is difficult to identify meaningful environmental benefits in this case.

Issuance of the variance will result in the conductivity of the canal/ditch system to increase somewhat for 2,500 meters of its length, where mixing with water from Bishop Harbor will cause the conductivity levels to rise to 40,000 micromhos per centimeter. Because it is highly unlikely that aquatic organisms in the canal system are not acclimated to marine waters, issuance of the variance should not adversely affect the aquatic diversity.

The probability of any reduction in diversity is also slight because intermittent flow in the system has already prevented the development of a highly diverse natural ecosystem. Equally important is the system's history of receiving agricultural and highway runoff containing elevated levels of conductivity.

Thus, AMAX believes environmental impacts from issuance of the variance will be limited to theoretical discussions which will be unsupportable by field evidence.

We feel the evidence strongly supports the extension of our request for extending, long term, a variance for specific conductance. If you have any questions, please let me know. Your prompt consideration is appreciated.

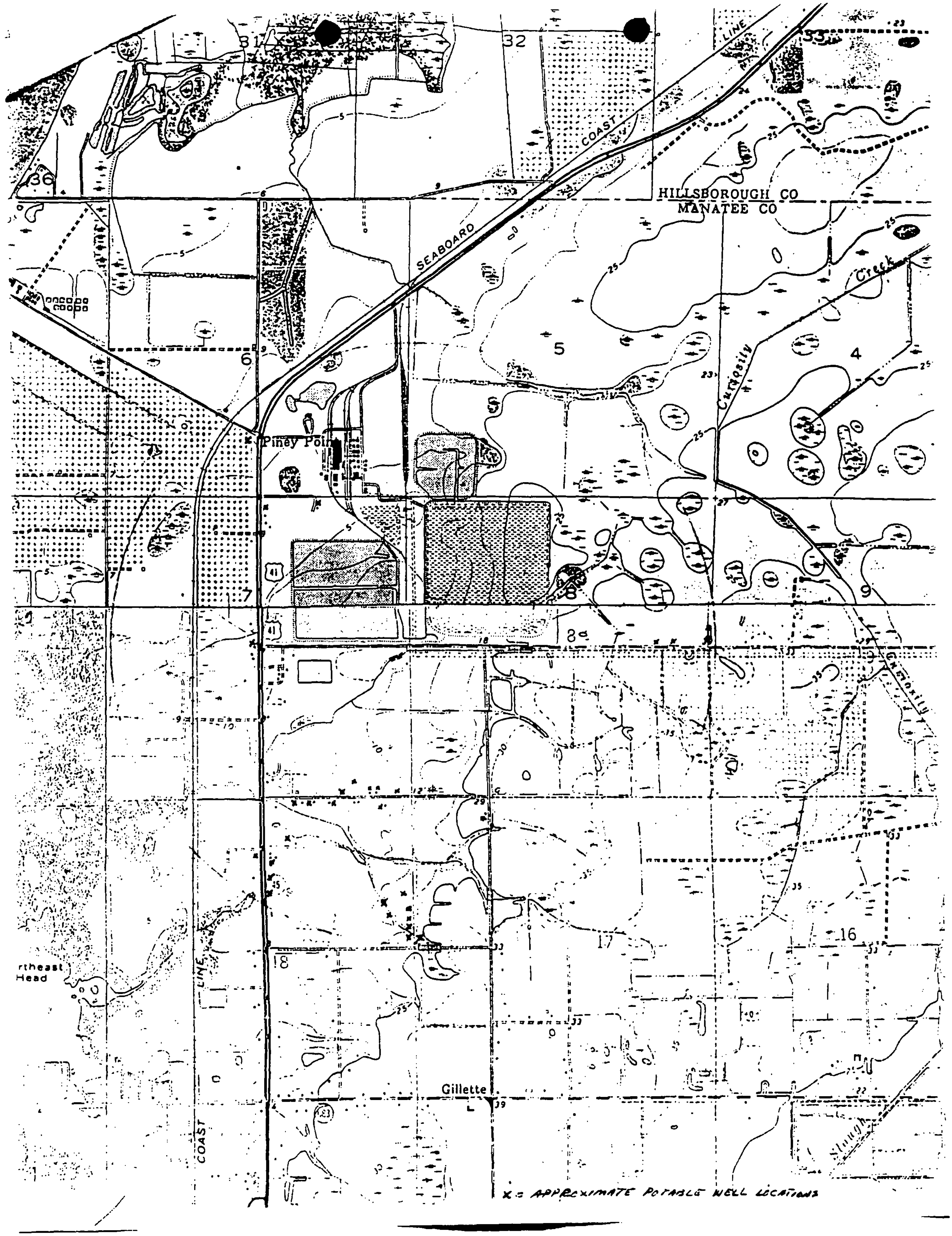
Yours very truly,

John G. Cladakis

John G. Cladakis
Senior Vice President and
Operations Manager

lj

cc: Mr. Peter McGarry, EPA
Mr. William Priesmeyer, Manatee County
Dr. Richard Garrity, D.E.R., Tampa
Mr. Larry Schwartz, D.E.R., Tallahassee
Mr. Bruce V. Galloway, AMAX


31
32
33
36
LINE
COAST
SEABOARD
HILLSBOROUGH CO
MANATEE CO
Creek
Curiosity
5
4
6
Piney Point
41
7
8
9
16
17
18
rtheast
Head
LINE
COAST
Gillette
Slough
X = APPROXIMATE POTABLE WELL LOCATIONS

PART III - INDUSTRIAL WASTEWATER TREATMENT PROCESS

A. General

1. Type of Industry Phosphate Fertilizer
2. SIC Code 2874
3. Raw Materials and Chemicals Used Phosphate rock, Sulfur, Water
   Anhydrous Ammonia
4. Production Rate 2000 tons/day sulfuric acid; 542 tons/day 100% P_2O_5,
   750 tons/day DAP
   tons/day, lbs/day, etc.
* 5. Normal Operation 24 hours per day/7 days per week/52 weeks per year
   hrs./day, days/week
6. If operation is seasonal, explain Not Applicable

B. Describe wastewater treatment process and identify treatment units.
003 - The effluent receives two-stage lime treatment for removal of fluorides and phosphates. The alkaline effuent is clarified, ammonia is removed and then acidulated to near neutral pH and discharged.

C. List sludge or slurry treatment units.

(Not applicable)

D. Describe volume, composition and disposal method of sludge. Identify location(s) of ultimate disposal.

The two-stage treatment process generates sludge consisting of calcium fluoride and calcium phosphate. Volume is a function of the need for treatment and discharge of effluent. Sludges are disposed of in the gypsum disposal area.

E. Method(s) and Location(s) of Flow Measurement.

Non-process outfalls 001 and 002, as well as the treated process water outfall 003 have 90 degree v-notch weirs and continuous flow analyzers.

F. Describe practices to be followed to ensure adequate waste treatment during emergencies such as power loss and equipment failures causing shut down of pollution abatement equipment of the proposed/permitted facilities.

Both the two-stage liming process and the acidulation process have malfunction alarms. These alarms are designed to alert plant personnel to malfunctions or failures in the system. Power failure systems will rely on battery backup for power.

G. Laboratory: List tests for which equipment/chemicals are provided, or contract laboratory to perform analysis.

P,F,pH,N, and suspended solids. The parameters are analyzed in accordan with EPA approved methods. When it is necessary to analyze parameters beyond the capability of the on-site laboratory, either a Company lab at another location or a certified commercial laboratory is utilized.

*Due to economic considerations, this facility was shut down in January, 1985 and has not operated since that time. (12/86)

PART V - EFFLUENT DISPOSAL

A. If effluent is discharged to surface waters, complete the following for each discharge point.

1. Immediate receiving body of water (RBW):

   a. Name Buckeye Road Drainage Ditch

   b. Type of receiving water: [X] Fresh [ ] Salt or brackish

   [X] Drainage Ditch
   [ ] Canal
   [ ] Creek
   [ ] River
   [ ] Other (Specify) ______
   [ ] Landlocked Lake
   [ ] Lake with Outfall
   [ ] Tidal Estuary
   [ ] Ocean or Gulf

   c. Classification of receiving water (in accordance with Rule 17-3): Class III

   d. Minimum 7-day 10 year low flow of the RBW at the discharge point (if appropriate): Not Available cfs

   e. Identify and describe the flow of effluent from the point of discharge to a major body of water. A suitably marked map or aerial photograph may be used.
   Discharge flows into Buckeye Road Drainage Ditch westward to southerly flowing railroad drainage di which ultimately discharges into Bishop Harbor which flows into Tampa Bay.

2. Outfall Information:

   a. Discharge location:
   Latitude 27 ° 37 ' 24 "N Longitude 82 ° 31 ' 54 "W

   b. Design configuration and construction materials:
   Effluent discharges from an underground concrete pipe into rectangular concrete spillway equipped with a 90^{o} V-notch weir.

   c. Distance from shore: Not Applicable

   d. Diameter: 90 Degree V-Notch Weir

   e. Elevation of discharge invert: Not Applicable MSL

   f. Receiving water bottom depth at point of discharge: 2" - 20" (Est) MSL

3. Do you request a mixing zone (refer to Fla. Admin. Code Rule 17-4.244)? If yes, for what parameters or pollutants?
   Current circumstances do not dictate the need for a mixing zone. Should future operations develop the need for a mixing zone, a request will be made at that time.

B. If effluent is discharged to groundwater, complete the following: Not Applicable

1. Disposal method:
   [ ] Slow Rate
   [ ] Rapid Rate
   [ ] Overland Flow
   [ ] Absorption Field
   [ ] Percolation/Evaporation Pond
   [ ] Combination (specify) ______
   [ ] Other (specify) ______

*See attached Copy of USGS Map. Discharge flows west in Buckeye Road drainage ditch to railroad ditch where it flows southward into Bishop Harbor which flows into Tampa Bay.

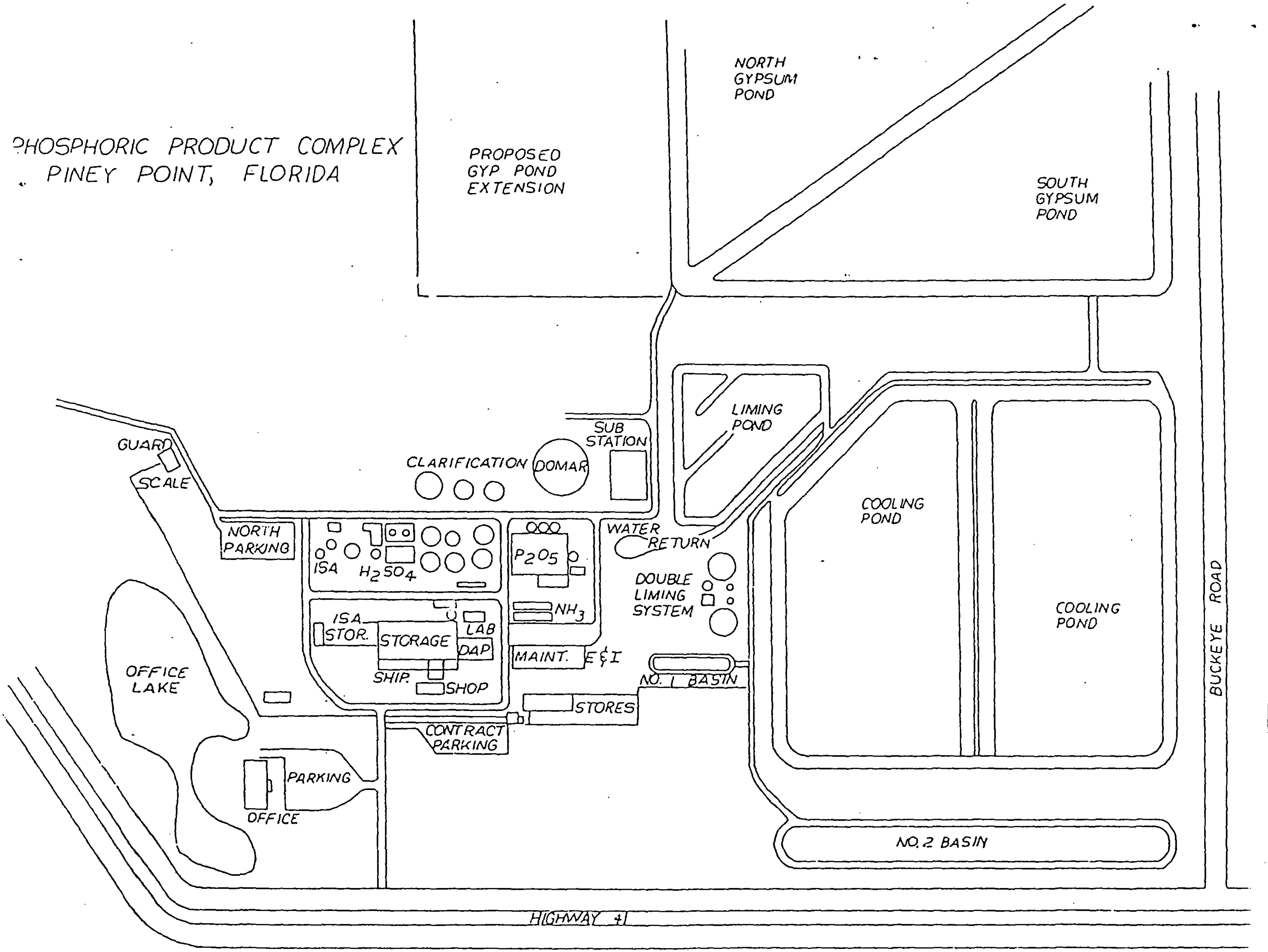
REFERENCE # 7

Royster Phosphates, Inc.

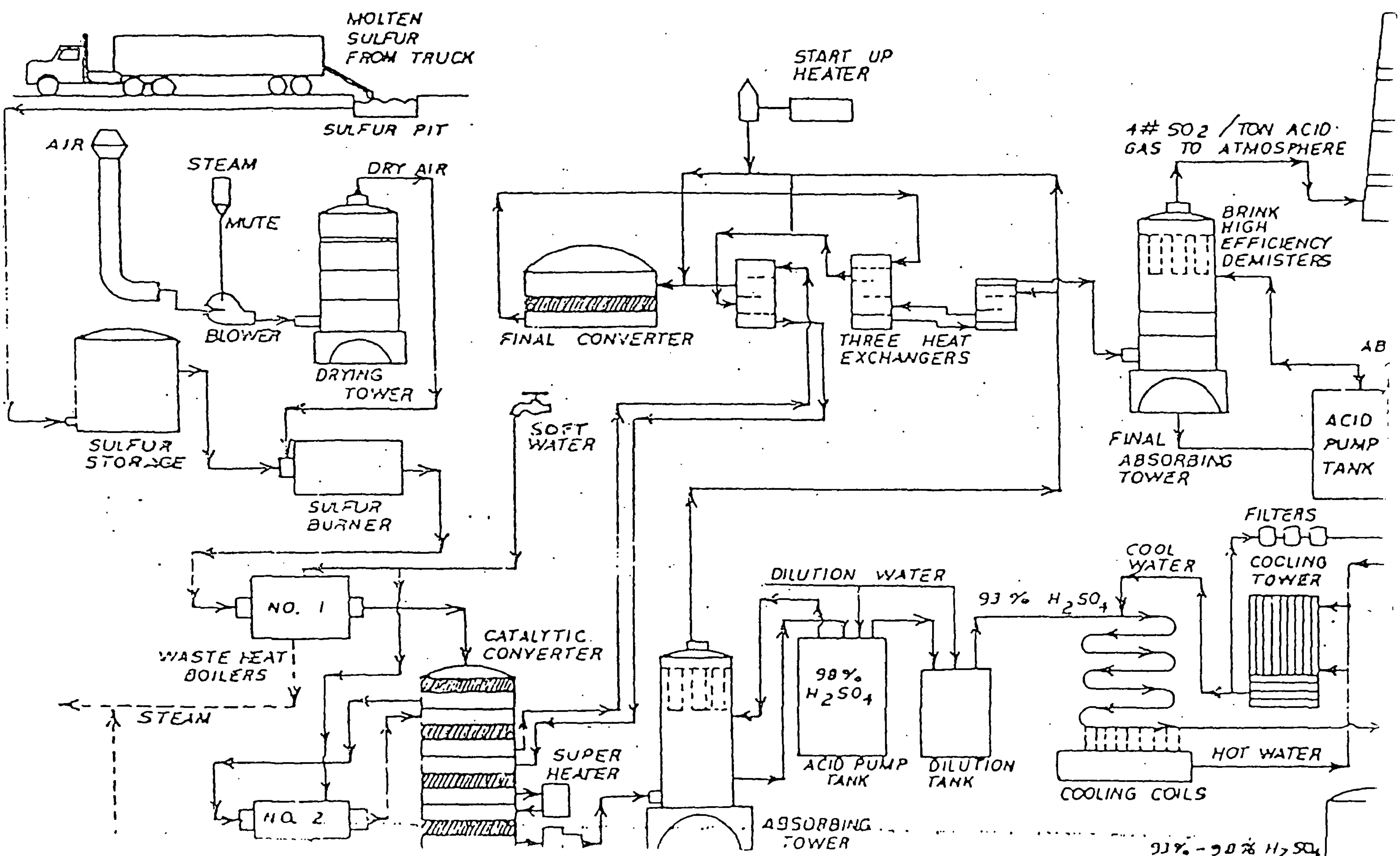
P. O. Box 1329
Palmetto, Florida 34220

PINEY POINT PHOSPHORIC COMPLEX
MANATEE COUNTY, FLORIDA

PHOSPHORIC PRODUCT COMPLEX
PINEY POINT, FLORIDA



Royster Phosphates, Inc. SULFURIC ACID PLANT (H_2SO_4) CONTACT PROCESS



Royster Phosphates, Inc.

P. O. Box 1329
Palmetto, Florida 34220

PHOSPHORIC PRODUCTS COMPLEX
PINEY POINT, FLORIDA

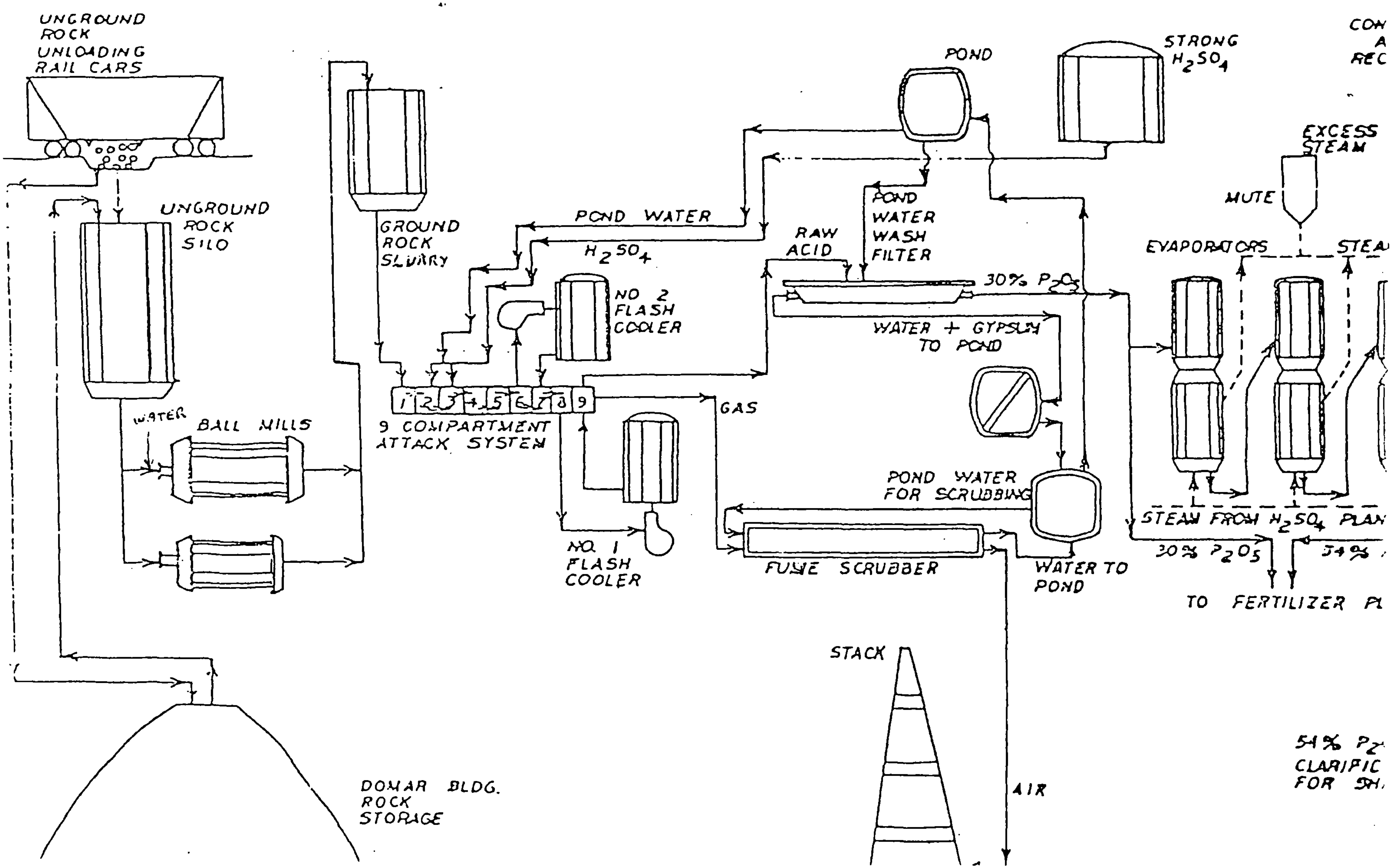
SULFURIC ACID

THE BASIC RAW MATERIALS FOR THE MANUFACTURE OF SULFURIC ACID ARE SULFUR, AIR AND WATER. AT THIS PLANT WE BRING IN MOLTEN SULFUR BY TRUCK WHICH HAS BEEN SHIPPED BY TANKER TO TAMPA FROM LOUISIANA OR TEXAS. THE SULFUR IS BURNED IN A CONTROLLED AMOUNT OF AIR, THEN IT IS CAUSED TO REACT ADDITIONALLY WITH OXYGEN IN THE AIR BY THE USE OF A CATALYST. THE PRODUCT FROM THIS LATTER REACTION IS ABSORBED IN SULFURIC ACID AND WATER TO PROVIDE THE CORRECT STRENGTH OF SULFURIC ACID. ALTHOUGH THE PROCESS IS CHEMICALLY SIMPLE, STRICT CONTROLS ARE NECESSARY IN ORDER TO HAVE AN ECONOMICALLY SOUND PROCESS THAT PREVENTS THE LOSS OF SULFUR COMPOUNDS TO THE ATMOSPHERE. BASICALLY, THE CONTROLS ARE ACID TEMPERATURE AND STRENGTH. TEMPERATURE IS CONTROLLED PRIMARILY BY THE OPERATION OF BOILERS AND COOLING COILS. THE ACID STRENGTH IS CONTROLLED BY ANALYSIS AND VARIOUS CONTROL INSTRUMENTS IN THE PLANT, THAT INDICATE WHEN WATER ADDITION IS NECESSARY.

THIS SULFURIC ACID PLANT WAS, AT ONE TIME, THE LARGEST SINGLE UNIT PLANT IN THE WORLD AND IS STILL ONE OF THE LARGEST. THE SIZE IS ILLUSTRATED BY THE LARGE SIZES OF PARTICULAR PIECES OF EQUIPMENT IN THE PLANT. THE STEAM TURBINE DRIVEN AIR BLOWER OF 3560 HORSEPOWER AND THE MASSIVE 4-PASS CONVERTER ARE PRIME EXAMPLES.

THE THREE CYLINDRICAL TOWERS OVER THE CONTROL ROOMS ARE, THE DRYING TOWER AND NO. 1 AND 2 ABSORBING TOWERS. THE AIR ENTERING THE PLANT IS CLEANED AND DRIED IN THE DRYING TOWER. THE TWO TALLER TOWERS ARE THE ABSORBING TOWERS, MECHANICALLY IDENTICAL TO THE DRYING TOWER. THEIR GREATER HEIGHT IS USED TO ACCOMMODATE HIGH EFFICIENCY BRINK MIST ELIMINATORS WHICH SAFEGUARD THE ENVIRONMENT BY EFFECTIVELY ELIMINATING THE POSSIBILITY OF ESCAPING ACID MIST OR OXIDES OF SULFUR.

Royster PHOSPHORIC ACID PLANT (P_2O_5) WET PROCESS



PHOSPHORIC ACID

THE BASIC RAW MATERIALS FOR THE PRODUCTION OF PHOSPHORIC ACID ARE PHOSPHATE ROCK, SULFURIC ACID AND WATER. WE OBTAIN PHOSPHATE ROCK FROM FLORIDA MINES AND THE SULFURIC ACID FROM OUR OWN PLANT.

THE WET PHOSPHATE ROCK IS FED WITH ADDITIONAL WATER TO ONE OF TWO BALL MILLS AND GROUND INTO A SLURRY RESEMBLING SOFT ICE CREAM. THE ROCK SLURRY IS THEN PUMPED FROM THE MILL DISCHARGE TANK TO THE COMPARTMENTED PHOSPHORIC ACID REACTION TANK.

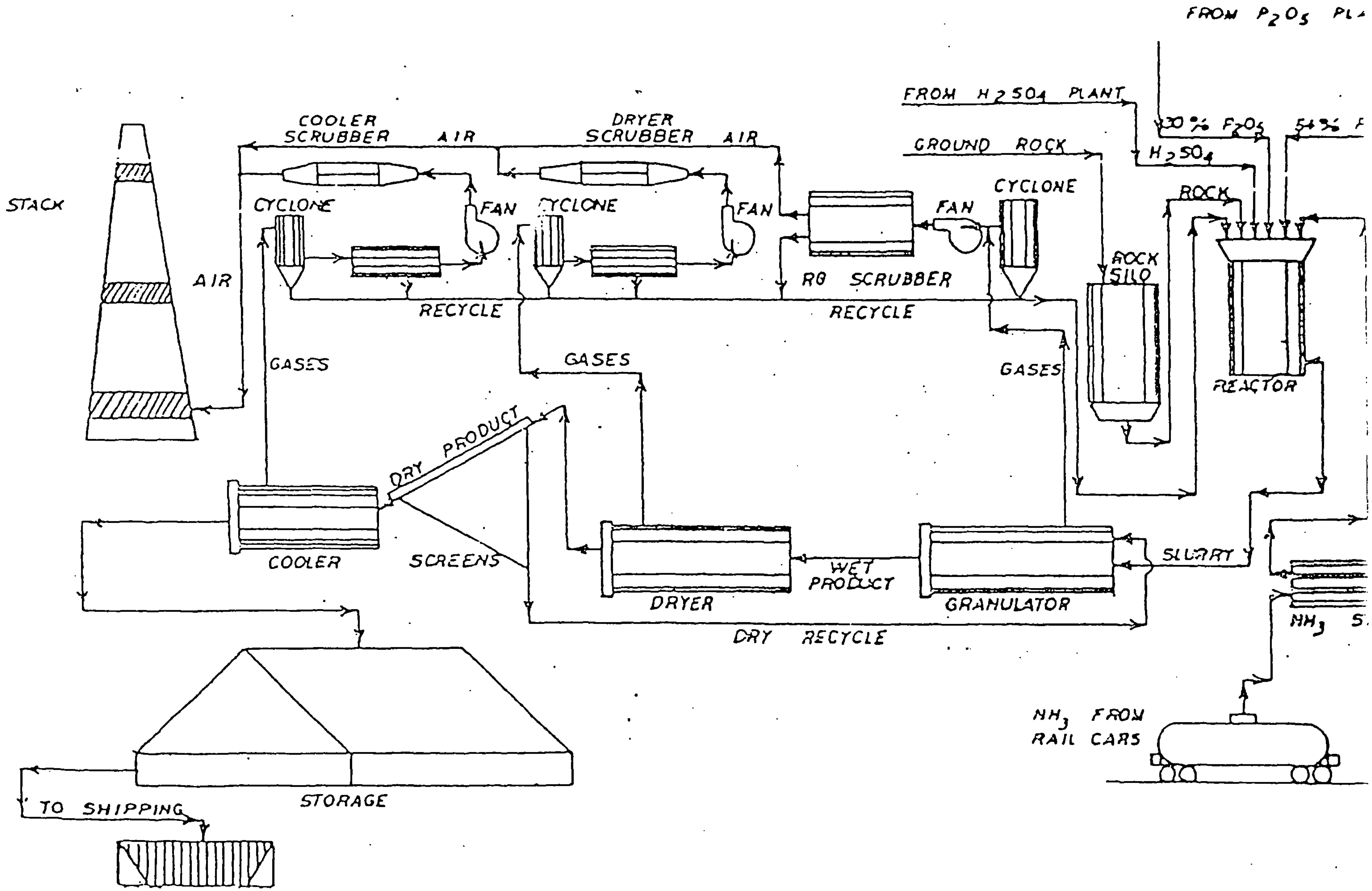
THE LIQUID SLURRY RESULTING FROM THE REACTION OF PHOSPHATE ROCK AND SULFURIC ACID IS FILTERED ON AN ELABORATE, CONTINUOUS FILTER AND PHOSPHORIC ACID IS REMOVED FROM THE FILTER AS PRODUCT. THE SOLIDS REMOVED BY THE FILTER ARE ESSENTIALLY GYPSUM (CALCIUM SULFATE DIHYDRATE) AND THIS MATERIAL IS TRANSPORTED AS A WATER SLURRY FROM THE FILTER TO A GYPSUM SETTLING POND. THE ACID PRODUCT FROM THE FILTER CONTAINS APPROXIMATELY 30% P_2O_5. (PHOSPHORIC ACID STRENGTH IN THE FERTILIZER INDUSTRY IS UNIVERSALLY ANALYZED AND REPORTED AS PERCENT P_2O_5. FROM A STRICT CHEMICAL POINT OF VIEW, THE 30% P_2O_5 PRODUCT IS ACTUALLY ABOUT 41% STRENGTH AS ORTHO PHOSPHORIC ACID, H_3PO_4.)

PHOSPHORIC ACID

THE 30% ACID IS CONCENTRATED TO ABOUT 54% P_2O_5 IN THREE (3) VACUUM EVAPORATORS TO MAKE A PRODUCT MORE SUITABLE FOR SHIPMENT. THE 54% ACID IS ALLOWED TO AGE AND SETTLE BEFORE SHIPMENT. THE AGING AND SETTLING WHICH REDUCE IMPURITIES IN THE ACID, IS CARRIED OUT IN THE LARGE TANKS JUST NORTH OF THE PHOSPHORIC ACID PLANT.

EXHAUST AIR FROM THE PHOSPHORIC ACID PROCESS IS WASHED WITH RECYCLED WATER TO SCRUB OUT HARMFUL GASES BEFORE DISCHARGE FROM THE STACK.

Royster DRY PRODUCTS – DIAMMONIUM PHOSPHATE OR TRIPLE SUPER PHOSPHATE



FERTILIZER PLANT

WE MANUFACTURE DIAMMONIUM PHOSPHATE (DAP 18-46-0) IN OUR FERTILIZER PLANT. WE ALSO HAVE THE ABILITY TO PRODUCE GRANULAR TRIPLE SUPER PHOSPHATE (GTSP 0-46-0). BASICALLY THE SAME EQUIPMENT IS USED IN PRODUCING EITHER PRODUCT. ONLY THE RAW MATERIALS USED, OR THEIR PROPORTIONS, ARE CHANGED.

TO PRODUCE 18-46-0, PHOSPHORIC ACID, FROM OUR PLANT, AND ANHYDROUS AMMONIA, WHICH IS BROUGHT IN BY RAILROAD, ARE THE BASIC INGREDIENTS. IF WE WERE PRODUCING 0-46-0 WE USE PHOSPHORIC ACID FROM OUR PLANT AND BRING IN GROUND 75 BPL (75% BONE PHOSPHATE OF LIME) PHOSPHATE ROCK FROM FLORIDA MINES.

IN BOTH PROCESSES THE RAW MATERIALS ARE ADDED TOGETHER IN A TANK WHERE THE CHEMICAL REACTIONS ARE COMPLETED AND THE RESULTING LIQUID SLURRY IS PUMPED TO THE SOLIDS MATERIALS HANDLING SYSTEM. IN THE SOLIDS SYSTEM THE REACTION PRODUCTS ARE DISTRIBUTED UPON A BED OF RETURNING SOLID MATERIAL. BY CONTROLLING THE PROPORTIONS OF REACTION PRODUCTS AND SOLID MATERIALS WE OBTAIN CONTROL OVER THE SIZE AND APPEARANCE OF THE FINISHED PRODUCT. AFTER THE PRODUCT HAS BEEN FORMED INTO THE DESIRED SIZE OF GRANULES IT IS DRIED, SCREENED AND CONVEYED TO THE PRODUCT STORAGE.

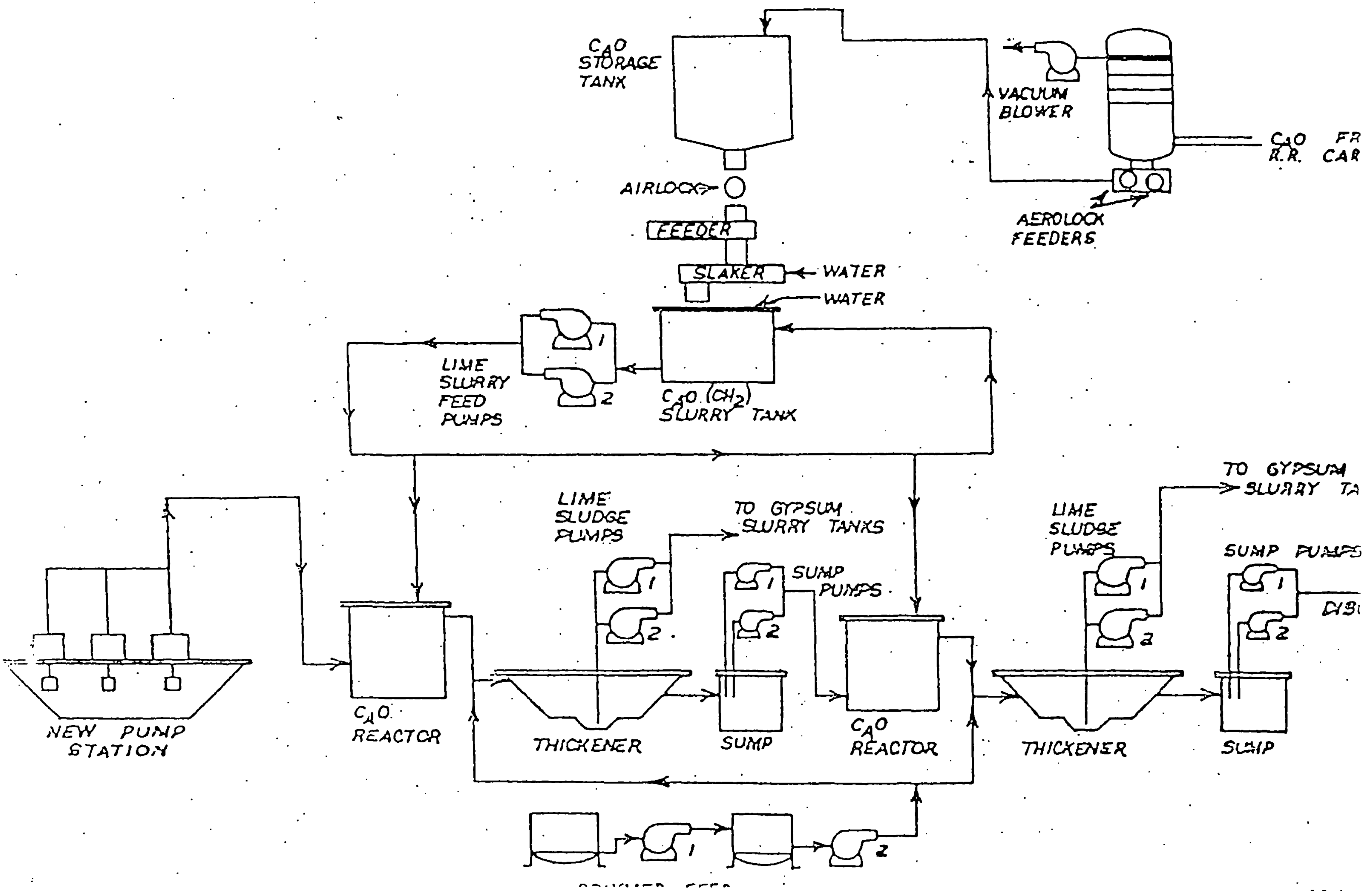
THIS PARTICULAR PLANT IS RATHER ADVANCED IN THAT THE MATERIALS HANDLING EQUIPMENT IS OF SUCH SIZE AND DESIGN THAT CONTROL OF THE PROCESSES IS CONVENIENTLY ACCOMPLISHED. IN PARTICULAR, THE DRYER IS 11′ IN DIAMETER AND 90′ LONG, WHICH

MAKES IT ONE OF THE LARGEST IN THE INDUSTRY. ALSO, OUR SCREENING CAPACITY FOR SIZE CONTROL IS VERY LARGE WITH RESPECT TO THE NORMAL AMOUNT OF MATERIAL PUT OVER IT. THE ABILITY TO ACCOMPLISH SUPERIOR DRYING AND SCREENING ALLOWS US TO MAKE A PRODUCT OF EXCELLENT HANDLING AND SHIPPING QUALITY.

MATERIAL RECOVERY PLAYS A SIGNIFICANT PART IN THE EFFICIENCY OF ANY FERTILIZER PLANT. BY INSTALLING A VERY ADVANCED SCRUBBER SYSTEM WE ARE ABLE TO KEEP OUR MATERIAL LOSS AT A MINIMUM. WE HAVE TOTAL OF SIX SEPARATE SCRUBBERS TO INSURE AGAINST THE LOSS OF THE DRY PRODUCT AS DUST, AND GASEOUS EMISSIONS WHICH MIGHT CAUSE POLLUTION. THE RATHER ELABORATE MASS OF DUCTING AND EQUIPMENT ON THE WESTERN SIDE OF THE PLANT MAKE UP THE MAJOR PART OF THE SCRUBBING SYSTEM. THE SIZES AND SHAPES OF THE DUCT WORK ARE ENGINEERED FOR MAXIMUM PERFORMANCE AND THIS SOMEWHAT COMPROMISES THEIR APPEARANCE.

THE PRODUCTS FROM OUR FERTILIZER PLANT MAY, AT TIMES, BE USED AS FINISHED PRODUCTS, BUT THEIR MAIN USE IS AS INTERMEDIATE PRODUCTS FOR USE IN THE PRODUCTION OF OTHER GRADES OF FERTILIZER. MOST OF THE MATERIAL IS EXPORTED, BUT IT COULD BE SHIPPED TO FERTILIZER PLANTS IN THE UNITED STATES.

Royster WATER TREATMENT — DOUBLE LIMING SYSTEM



WATER TREATMENT

IN THE PRODUCTION OF PHOSPHORIC ACID AND PHOSPHATE FERTILIZER, GASSES AND PARTICULATES (DUST OR LIQUID DROPLETS) ARE EMITTED TO THE ATMOSHPERE. THESE EMITANTS ARE CAPTURED IN WATER STREAMS WITHIN SO-CALLED SCRUBBERS. THIS WATER IS RECIRCULATED AND REUSED IN THE VARIOUS PRODUCTION PROCESSES.

PART OF THE PRODUCTION CYCLE IS THE REMOVAL OF GYPSUM FROM PHOSPHORIC ACID BY FILTRATION. THE GYPSUM COMES OFF THE FILTER AS A SOLID AND IN OUR SYSTEM IS SLURRIED WITH WATER TO BE REMOVED FROM THE PLANT TO A GYPSUM STACKING AREA. HERE THE WATER IS ALLOWED TO SEPARATE FROM THE GYPSUM AND FORMS THE RECIRCULATION WATER FOR REUSE IN THE PRODUCTION OF PHOSPHATE PRODUCTS. ONCE WATER HAS COME INTO CONTACT WITH EITHER THE GASEOUS EMISSIONS, DUST, OR GYPSUM IT IS THEN CONTAMINATED AND CANNOT BE RELEASED FROM THE PLANT SITE. THEREFORE IT IS NECESSARY TO HAVE LARGE HOLDING PONDS THAT CAN CONTAIN SEVERAL MILLION GALLONS OF WATER.

DURING MOST YEARS ALL WATER REQUIREMENTS FOR THE PHOSPHORIC ACID COMPLEX CAN BE SATISFIED BY THE RAINFALL/EVAPORATION BALANCE ON THE POND SYSTEM. HOWEVER, DURING SOME RAINY PERIODS THE WATER LEVELS IN THE PONDS MAY EXCEED THE VOLUMES ESTABLISHED FOR WATER CONTAINMENT. THIS CRITICAL LEVEL IS DETERMINED BY THE AMOUNT OF STORAGE NEEDED TO CONTAIN HIGH RAINFALL EVENTS (UP TO 10 INCHES IN 24 HOURS).

IN ORDER TO MAINTAIN THE WATER LEVEL BELOW THIS POINT, WATER TREATMENT FACILITIES MUST BE AVAILABLE. TREATMENT MUST TAKE WATER THAT HAS A pH OF BELOW ≈ 3.0 AND CONTAINS LARGE AMOUNTS OF FLUORIDE AND PHOSPHORUS, AND NEUTRALIZE IT TO A pH OF 6.0 - 9.0, AND REDUCE THE FLUORIDE AND PHOSPHORUS LEVELS TO JUST A FEW PARTS PER MILLION. THE EQUIPMENT NECESSARY TO DO THIS IS CALLED A "DOUBLE LIMING" FACILITY AND INVOLVES A TWO STAGE TREATMENT OF THE WATER. THE LIME COMES INTO THE PLANT AS PEBBLE, IT IS THEN PRE-REACTED WITH WATER (THIS IS CALLED SLAKING) AND SLURRIED WITH MORE WATER TO MAKE IT SUITABLE FOR WATER NEUTRALIZATION.

IN THE FIRST STAGE, LIME SLURRY AND CONTAMINATED WATER ARE MIXED TO REMOVE THE FLUORIDE. THE SOLID MATERIAL FORMED SETTLES FROM THE MIXTURE. THE WATER FROM THIS STAGE THEN IS REACTED WITH MORE LIME SLURRY, IN A DIFFERENT VESSEL, FORMING MORE SOLIDS TO REMOVE THE PHOSPHORUS. IN EACH STAGE SOLIDS ARE FORMED AND MUST BE MECHANICALLY REMOVED TO PREVENT THEM FROM RECONTAMINATING THE WATER. THE SOLIDS ARE DISPOSED WITH THE GYPSUM INTO THE STACKING AREA. THE TREATED WATER IS THEN SENT TO A HOLDING POND FOR FINAL CLARIFICATION BY SETTLING. IT IS PURE ENOUGH TO BE RELEASED TO THE RECEIVING BODY OF WATER, IN OUR CASE, A SALT WATER ESTUARY. EACH STAGE OF THE LIMING PROCESS IS MONITORED FOR pH WITH THE FINAL WATER BEING MONITORED THREE TIMES FOR pH AND CONTAMINATES BEFORE IT IS RELEASED.

PB90-258492

REFERENCE # 8

REPORT TO CONGRESS ON SPECIAL WASTES FROM MINERAL PROCESSING - SUMMARY AND FINDINGS METHODS AND ANALYSES APPENDICES

(U.S.) Environmental Protection Agency
Washington, DC

Jul 90

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
NTIS®

PB90-258492

United States
Environmental Protection
Agency

Solid Waste and
Emergency Response
(OS-305)

EPA/530-SW-90-070C
July 1990

EPA

Report to Congress on Special Wastes from Mineral Processing

Summary and Findings
Methods and Analyses
Appendices

Chapter 12
Phosphoric Acid Production

The phosphoric acid production industry consists of 21 facilities that were active as of September 1989,[1] employed the wet phosphoric acid production process, and generated two special wastes from mineral processing: process wastewater and phosphogypsum. The data included in this chapter are discussed in additional detail in a technical background document in the supporting public docket for this report.

12.1 Industry Overview

There are two processes for producing phosphoric acid: (1) the wet process, which is a mineral processing operation and is studied here, and (2) the furnace process. Furnace process phosphoric acid production uses elemental phosphorus rather than beneficiated phosphate rock as a feedstock and, therefore, wastes generated by the process are not mineral processing special wastes according to the Agency's definition of mineral processing. Consequently, furnace process production of phosphoric acid is not within the scope of this report.

About 95 percent of the commercial phosphoric acid produced by the wet process is used in the production of fertilizers and animal feed, with a small portion used as a feedstock in chemical processing operations.[2] Typically, the fertilizer and feed plants are co-located with the phosphoric acid facilities.

As shown in Exhibit 12-1, the majority of the 21 active wet process facilities are located in the southeast, with 12 in Florida, three in Louisiana, and one in North Carolina. Production data and dates of initial operation and modernization were provided by all 21 facilities, although two claimed confidential status for their information. The dates of initial operation for the 19 non-confidential facilities ranges from 1945 to 1986.[3] Most of these facilities have undergone modernization within the last ten years, although six facilities have not been upgraded in over 20 years. The 19 reporting non-confidential facilities have a combined annual production capacity of over 11 million metric tons and a 1988 aggregate production of nearly 8.5 million metric tons; the 1988 capacity utilization rate, therefore, was approximately 77 percent. Several facilities, however, operated at low utilization rates (i.e. three facilities reported rates of 15.8, 30.1 and 37.5 percent).

The fertilizer industry, the largest user of phosphoric acid, suffered poor financial conditions for much of the 1980s. These conditions were the result of low domestic demand and reduced foreign buying. Domestic demand for phosphoric acid was boosted by the 1988 recovery of the farm economy and was expected to continue to grow as crop prices and planted acreage increased in 1989. Non-fertilizer uses of phosphoric acid declined during the 1980s due to strict regulations governing the use of phosphates in household products and a decline in industrial demand.[4]

The wet process consists of three operations: digestion, filtration, and concentration, as shown in Exhibit 12-2.[5] Beneficiated phosphate rock is dissolved in phosphoric acid; sulfuric acid is added to this solution and chemically digests the calcium phosphate. The product of this operation is a slurry that consists

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[1] At least two facilities were on standby in 1988, Agrico's Ft. Madison, Iowa and Hahnville (Taft), Louisiana facilities; they are not included in this analysis.

[2] Bureau of Mines, 1987. Minerals Yearbook, 1987 Ed., p. 676.

[3] Phosphoric acid producers, 1989. Company Responses to the "National Survey of Solid Wastes from Mineral Processing Facilities," U.S.EPA, 1989.

[4] Standard & Poor's, "Chemicals: Basic Analysis," Industry Surveys, October 13, 1988 (Section 3), p. C20.

[5] Environmental Protection Agency, 1986. Evaluation of Waste Management for Phosphate Processing. Prepared by PEI Associates for U.S. EPA, Office of Research and Development, Cincinnati, OH, August, 1986.

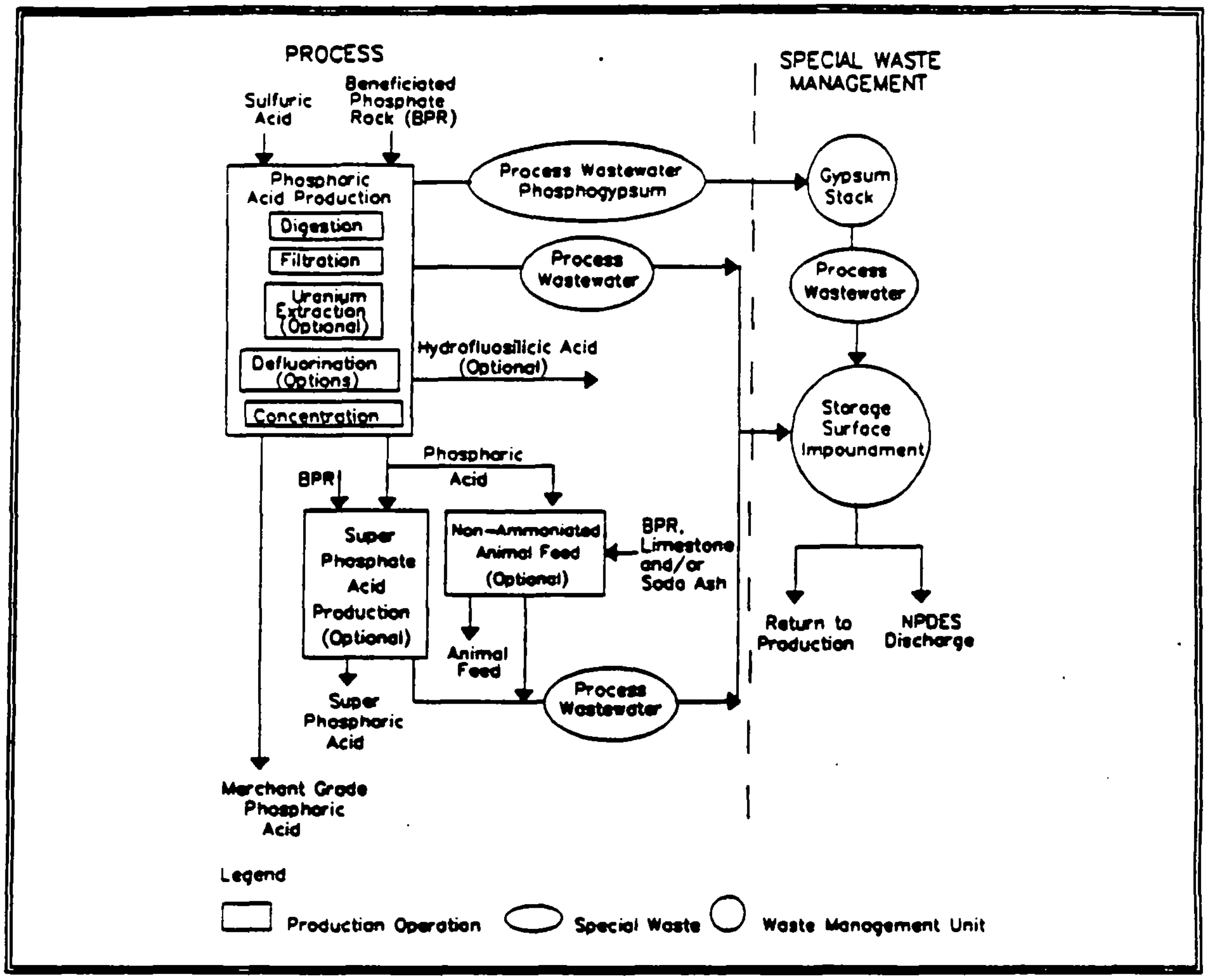
Exhibit 12-1
Wet Processing Phosphoric Acid Plants

Operator	Location	Parent Company
Agrico	Donaldsonville, LA	Freeport-McMoRan Res. Part.
Agrico	Mulberry (Pierce), FL	Freeport-McMoRan Res. Part.
Agrico	Uncle Sam, LA	Freeport-McMoRan Res. Part.
Arcadian	Geismar, LA	(same as operator)
Central Phos.	Plant City, FL	CF Industries
CF Chemicals	Bartow (Bonnie), FL	(same as operator)
Chevron Chem.	Rock Springs, WY	Chevron Corp.
Conserv	Nichols, FL	(same as operator)
Farmland Ind.	Bartow (Pierce), FL	(same as operator)
Fort Meade Chem.	Fort Meade, FL	US Agri-Chem and WR Grace
Gardinier	Riverview (Tampa), FL	(same as operator)
IMC Fertilizer	New Wales (Mulberry), FL	(same as operator)
Mobil Mining	Pasadena, TX	Mobil Oil Corp.(Mobil Corp.)
Nu-South Ind.	Pascagoula, MS	Nu-West Industries
Nu-West	Soda Springs (Conda), ID	(same as operator)
Occidental Chem.	White Springs, FL	Occidental Petroleum
Royster	Mulberry, FL	Cedar Holding Co.
Royster	Palmetto (Piney Pt), FL	Cedar Holding Co.
Seminole Fert.	Bartow, FL	(same as operator)
JR Simplot	Pocatello, ID	(same as operator)
Texasgulf	Aurora, NC	(same as operator)

of the phosphoric acid solution and a suspended solid, calcium sulfate, commonly known as phosphogypsum. The slurry is routed to a filtration operation where the suspended phosphogypsum is separated from the acid solution. The acid isolated during filtration is concentrated through evaporation to produce "merchant-grade" (54 percent) phosphoric acid. The phosphogypsum is re-slurried, this time in recycled process wastewater, so that it can be pumped to the disposal area. In addition to the large volume of phosphogypsum generated by the wet process, large volumes of process wastewaters are produced, primarily from phosphogypsum transport, phosphoric acid concentration, and process temperature control and cooling. These wastewaters are managed in impoundments and primarily recycled, although some facilities have permits to discharge wastewaters to ground water or surface water.[6]

[6] As discussed in detail in the preamble to the final rule that retained the exclusion from RCRA Subtitle C regulations for process wastewater (see 55 FR 2322, January 23, 1990), these are not the only sources of process wastewater. "Process wastewater from phosphoric acid production" also includes phosphogypsum stack runoff, process wastewater generated from the uranium recovery step of phosphoric acid production, process wastewater from animal feed production (including defluorination but excluding ammoniated animal feed production), and process wastewater from superphosphate production.

Exhibit 12-2
Phosphoric Acid Production



12.2 Waste Characteristics, Generation, and Current Management Practices

12.2.1 Phosphogypsum

Phosphogypsum, which has an average particle diameter of less than 0.02 millimeters, is primarily composed of calcium sulfate, silicon, phosphate, and fluoride. It also typically contains a variety of radionuclides, including uranium-230, uranium-234, thorium-230, radium-226, radon-222, lead-210 and polonium-210.

Using available data on the composition of phosphogypsum, EPA evaluated whether leachate from this material exhibits any of the four characteristics of hazardous waste: corrosivity, reactivity, ignitability, and extraction procedure (EP) toxicity. Based on available information and professional judgment, the Agency does not believe phosphogypsum is reactive, corrosive, or ignitable. Some phosphogypsum samples, however, exhibit the characteristic of EP toxicity. EP leach test concentrations of all eight inorganic constituents with EP toxicity regulatory levels are available for 28 phosphogypsum samples from 11 facilities of interest. Of these constituents, only chromium concentrations exceed the EP toxicity levels; this occurred in 2 of 28 samples analyzed, by as much as a factor of 9. Both samples that failed the EP toxicity criterion for chromium were from the Rock Springs facility. The phosphogypsum samples that failed the EP toxic level were also analyzed using the SPLP leach test, and for both samples, concentrations of chromium measured by the SPLP leach test were well below the EP toxicity regulatory levels.

Non-confidential waste generation rate data were reported for phosphogypsum by 18 of the 21 processing facilities and estimated for the remaining three. The aggregate annual industry-wide generation of phosphogypsum was approximately 47.6 million metric tons in 1988, yielding a facility average of about 2.26 million metric tons per year. Reported facility generation rates ranged from .14 to 6.8 million metric tons of phosphogypsum. The sector-wide ratio of phosphogypsum to phosphoric acid ranges from 3.7 to 5.6, averaging 4.9 for the sector.

Phosphogypsum is managed in basically the same way at virtually all of the 21 active facilities. The phosphogypsum removed by the filtration step in the phosphoric acid production process is slurried in process wastewater and pumped to one or more impoundments located on the top of an on-site waste pile known in the industry as a gypsum stack. In the impoundment, the gypsum solids are allowed to settle; the liquid (process wastewater) is either directly removed from the settling pond and sent to a nearby cooling pond or indirectly removed after it seeps though the stack and is collected by ditches or ponds that circumscribe the stack.

Periodically, the phosphogypsum slurry is diverted from one impoundment on the gypsum stack to another and the first impoundment is allowed to dry. The dewatered phosphogypsum is excavated from the inactive pond and used to build up the dike that forms the impoundment and then the impoundment is returned to active service. In this manner, the stack with its series of settling ponds increases in height and accumulates additional phosphogypsum. The ultimate height and area of the resulting stack depends on the configuration of the facility's property and the ability of the native soils to support the load of the stack. After a stack is "full", rainwater that runs off or leaches through the stack continues to be collected in the perimeter ditch and is usually managed with water collected from active stacks.

The average dimensions of the gypsum stacks are 130 hectares (320 acres) at the base and 35 meters (115 feet) in height; on a facility-specific basis the stacks range from about 20 to 260 hectares and 3 to 130 meters in height. The average dimensions of the settling ponds atop these stacks are 54 hectares and 1.4 meters in depth; on a facility-specific basis the ponds range in size from 2.6 to 26 hectares and in depth from .3 to 7.6 meters.

12.2.2 Process Wastewater

Process wastewaters are generated at several points in phosphoric acid production, including phosphoric acid concentration, and phosphoric acid temperature control and cooling. These wastewaters contain significant quantities of chloride, fluoride, phosphate, and have a pH that ranges from 0.5 to 7.8.

Using available data on the composition of phosphoric acid process wastewater, EPA evaluated whether the wastewater exhibits any of the four characteristics of hazardous waste: corrosivity, reactivity, ignitability, and extraction procedure (EP) toxicity. Based on available information and professional judgment, the Agency does not believe the wastewater is reactive or ignitable. Some wastewater samples, however, exhibit the characteristics of corrosivity and EP toxicity. Measurements of pH in 42 out of 68 process wastewater samples from a total of 14 facilities indicated that the wastewater was corrosive, sometimes with pH values as low as 0.5 (the lower bound pH limit for the purpose of defining corrosive waste is 2.0). EP leach test concentrations of all eight constituents with EP toxicity regulatory levels are available for process wastewaters from 7 facilities. Of these constituents, cadmium and chromium concentrations were found to sometimes exceed the EP toxicity levels, and one sample was found to have a selenium concentration equal to the EP toxicity regulatory level. Concentrations of cadmium exceeded the EP toxic level in process wastewater samples from three facilities, Pocatello, Geismar, and Aurora. Cadmium was present at concentrations in excess of the EP toxic level in 19 out of 30 samples by as much as a factor of 8. From a total of 30 samples, chromium concentrations exceeded the EP toxicity regulatory level (by as much as a factor of 2.7) in only 3 samples (2 of which were from the Pocatello facility and 1 from the Pascagoula facility). SPLP leach test results for phosphoric acid process wastewater samples were well below the EP toxicity regulatory levels for all constituents.

Non-confidential waste generation rate data were fully reported for process water by 12 of the 21 processing facilities and estimated for the remaining nine. The aggregate annual industry-wide generation of process water was approximately 1.77 billion metric tons (468 billion gallons) in 1988, yielding a facility average of 84 million metric tons per year (60 million gallons per day [mgd]). Reported facility annual generation rates ranged from 13 to 280 million metric tons of process wastewater (9.3 to 200 mgd). The ratio of process water managed to phosphoric acid produced ranges from 102 to 494.

The process wastewater from the stacks, along with non-transport process waters, are typically managed in on-site impoundments, commonly known as cooling ponds. These impoundments are used in conjunction with the gypsum stacks in an integrated system. Water from these ponds is reused in on-site mineral processing and other activities. The facility operators ideally seek to maintain a water balance such that no treatment and discharge of process wastewater to surface water is necessary, although some facilities are equipped to treat and discharge some wastewater during periods of high precipitation.

The average dimensions of the cooling ponds are nearly 60 hectares (145 acres) of surface area and 2.6 meters (8.5 feet) of depth; on a facility-specific basis the surface area ranges from 1 to 260 hectares (2.5 to 640 acres) and depth ranges from 0.3 to 6.7 meters (1 to 21 feet).

12.3 Potential and Documented Danger to Human Health and The Environment

This section addresses two of the study factors required by §8002(p) of RCRA: (1) potential danger (i.e., risk) to human health and the environment; and (2) documented cases in which danger to human health or the environment has been proven. The Agency's evaluation of the potential dangers posed by phosphogypsum and phosphoric acid process wastewater uses the evidence presented in numerous documented cases of danger to human health and the environment to establish that these wastes can threaten human health and the environment as they are currently managed. Overall conclusions about the hazards associated with phosphogypsum and phosphoric acid process wastewater are provided after these two study factors are discussed.

12.3.1 Risks Associated With Phosphogypsum and Phosphoric Acid Process Wastewater

Any potential danger to human health and the environment from phosphogypsum and phosphoric acid process wastewater depends on the presence of toxic and radioactive constituents in the wastes that may present a hazard and the potential for exposure to these constituents. The Agency has documented cases of dangers posed by these wastes via ground and surface water pathways (see Section 12.3.2), and has previously evaluated potential air pathway dangers from the management of phosphogypsum in stacks. Based on the insights provided by analyses of the hazards posed by phosphogypsum and phosphoric acid wastewater, and information on waste characteristics and management developed for this study, the Agency evaluated the intrinsic hazard of these wastes and the potential for toxic and radioactive constituents from these wastes to pose threats to human health and the environment. This evaluation discusses constituents of potential concern in the wastes and assesses the management practice and environmental setting characteristics that affect the potential for these wastes to pose risks through the ground-water, surface water, and air pathways.

Phosphogypsum Constituents of Potential Concern

EPA identified chemical constituents in phosphogypsum that may present a hazard by collecting data on the composition of this waste and evaluating the intrinsic hazard of the chemical constituents.

Data on Phosphogypsum

EPA's characterization of phosphogypsum and its leachate is based on data from three sources: (1) a 1989 sampling and analysis effort by EPA's Office of Solid Waste (OSW); (2) industry responses to a RCRA §3007 request; and (3) sampling and analysis conducted by EPA's Office of Research and Development (ORD) in 1986. These data provide information on the concentrations of 21 metals, radium-226, thorium-232, uranium-238, gross alpha and beta radiation, a number of other inorganic constituents (i.e., phosphate, phosphorus, fluoride, chloride, sulfate, ammonia, and nitrate), and five organic constituents in total and leach test analyses. Thirteen of the 21 phosphoric acid production facilities are represented by these data.

Concentrations of most (i.e., 21 of 38) constituents in solid samples of phosphogypsum vary considerably among the samples analyzed (i.e., the range of values spans more than three orders of magnitude). Concentration data provided by industry represent a larger number of samples and span a wider range of values than do data from EPA's sampling and analysis efforts. EPA sampling and analysis data for some constituents (i.e., arsenic, selenium, silver, and thallium) do not contribute to the characterization of phosphogypsum because the detection limits used in analyzing these samples are higher than any detected concentrations from analyses of other samples.

Concentrations of most constituents in leach test analyses of phosphogypsum vary considerably less than do concentrations in solid samples (i.e., the ranges of values span less than two orders of magnitude). However, concentrations of chromium, copper, iron, lead, and zinc in EP leach test analyses vary over three or more orders of magnitude. Concentrations from analyses using the EP leach test method are consistently higher than from SPLP method analyses.

Process for Identifying Constituents of Potential Concern

As discussed in Chapter 2, the Agency evaluated the waste composition data summarized above to determine if phosphogypsum contains any chemical constituents that could pose an intrinsic hazard. The Agency performed this evaluation by first comparing the concentration of chemical constituents to screening criteria that reflect the potential for hazards, and then by evaluating the environmental persistence and mobility of constituents that are present at levels above the criteria. These screening criteria were developed using assumed scenarios that are likely to overestimate the extent to which constituents in phosphogypsum are released to the environment and migrate to possible exposure points. As a result, this process eliminates from further consideration only those constituents that clearly do not pose a risk.

The Agency used three categories of screening criteria that reflect the potential for hazards to human health, aquatic ecosystems, and air and surface/ground water resources (see Exhibit 2-3). Given the conservative (i.e., protective) nature of these screening criteria, contaminant concentrations in excess of the criteria should not, in isolation, be interpreted as proof of hazard. Instead, exceedances of the criteria indicate the need to evaluate the potential hazards of the waste in greater detail.

Identified Constituents of Potential Concern

Exhibits 12-3 and 12-4 present the results of the comparisons for phosphogypsum solid analyses and leach test analyses, respectively, to the screening criteria described above. These exhibits list all constituents for which at least one sample concentration exceeds a relevant screening criterion.

Of the 38 constituents analyzed in total analyses of phosphogypsum, only radium-226, uranium-238, chromium, and arsenic are present at concentrations exceeding the screening criteria (Exhibit 12-3). Maximum concentrations of these constituents are at most seven times the screening criteria. The sample concentrations of the first three of these constituents (i.e., all except arsenic) exceed screening criteria in at least half of the

Exhibit 12-3
Potential Constituents of Concern in Phosphogypsum Solids[a]

Potential Constituents of Concern	No. of Times Constituent Detected/No. of Analyses for Constituent	Human Health Screening Criteria[b]	No. of Analyses Exceeding Criteria/ No. of Analyses for Constituent	No. of Facilities Exceeding Criteria/ No. of Facilities Analyzed for Constituent
Radium-226	29 / 29	Radiation*[c]	28 / 29	6 / 7
Uranium-238	18 / 18	Radiation*[c]	1 / 18	1 / 3
Chromium	34 / 43	Inhalation*	8 / 43	4 / 8
Arsenic	35 / 43	Ingestion* Inhalation*	34 / 43 29 / 43	2 / 8 1 / 8

(a) Constituents listed in this table are present in at least one sample from at least one facility at a concentration that exceeds a relevant screening criterion. The conservative screening criteria used in this analysis are listed in Exhibit 2-3. Constituents that were not detected in a given sample were assumed not to be present in the sample.

(b) Human health screening criteria are based on exposure via incidental ingestion and inhalation. Human health effects include cancer risk and noncancer health effects. Screening criteria noted with an "*" are based on a $1x10^{-5}$ lifetime cancer risk; others are based on noncancer effects.

(c) Includes direct radiation from contaminated land and inhalation of radon decay products.

facilities analyzed. None of these constituents, however, exceed the screening criteria by more than a factor of 10.

- Radium-226, and uranium-238 concentrations exceed health-based screening criteria based on multiple radiation pathways. Exceedance of these criteria indicates that phosphogypsum could pose an unacceptable radiation risk if used in an unrestricted manner (for instance, direct radiation doses and doses from the inhalation of radon could be unacceptably high if phosphogypsum is used around homes).
- Chromium and arsenic concentrations exceed the health-based screening criteria for inhalation. This indicates that these constituents could pose a significant cancer risk (i.e., greater than $1x10^{-5}$) if phosphogypsum were released to the ambient air as particles.
- Arsenic concentrations exceed the health-based screening criteria for incidental ingestion. This indicates that arsenic may pose a significant incremental lifetime health risk (i.e., greater than $1x10^{-5}$) if a small quantity of phosphogypsum or soil contaminated with phosphogypsum is inadvertently ingested on a routine basis (e.g., airborne waste particles may be deposited on crops, or small children playing on abandoned stacks could inadvertently ingest the waste).

EPA sampling and analysis also indicates that levels of gross alpha and beta radiation from phosphogypsum are very high (10 to 100 pCi/g) relative to levels associated with typical soils (approximately 1 pCi/g).

Based on a comparison of leach test concentrations of 29 constituents to surface and ground-water pathways screening criteria (see Exhibit 12-4), 17 constituents were found to be of potential concern for water-based release and exposure. Among these 17 constituents, phosphorus, arsenic, lead, phosphate, manganese, molybdenum, and nickel exceed screening criteria in at least one-half of all facilities analyzed. Twelve constituents exceed the screening criteria by more than a factor of 10, but only chromium was measured in concentrations that exceed the EP toxicity regulatory level. All of these constituents are very persistent in the environment.

Exhibit 12-4
Potential Constituents of Concern in Phosphogypsum Leachate[a]

Potential Constituents of Concern	No. of Times Constituent Detected/No. of Analyses for Constituent	Screening Criteria[b]	No. of Analyses Exceeding Criteria/ No. of Analyses for Constituent	No. of Facilities Exceeding Criteria/ No. of Facilities Analyzed for Constituent
Phosphorus	17 / 17	Aquatic Ecological	17 / 17	9 / 9
Arsenic	19 / 28	Human Health*	19 / 28	10 / 11
Lead	14 / 28	Human Health Resource Damage Aquatic Ecological	4 / 28 12 / 28 2 / 28	3 / 11 7 / 11 2 / 11
Phosphate	19 / 19	Aquatic Ecological	19 / 19	9 / 9
Manganese	21 / 22	Resource Damage	9 / 22	6 / 11
Molybdenum	16 / 20	Resource Damage	10 / 22	6 / 10
Nickel	19 / 22	Resource Damage Aquatic Ecological	2 / 22 10 / 20	2 / 11 6 / 11
Iron	20 / 20	Resource Damage Aquatic Ecological	6 / 20 1 / 20	4 / 10 1 / 10
Cadmium	28 / 28	Human Health Resource Damage Aquatic Ecological	4 / 28 7 / 28 7 / 28	3 / 11 4 / 11 4 / 11
Chromium	27 / 28	Human Health Resource Damage Aquatic Ecological	2 / 28 5 / 28 4 / 28	1 / 11 3 / 11 2 / 11
Silver	14 / 28	Aquatic Ecological	6 / 28	3 / 10
Fluoride	17 / 17	Human Health	3 / 17	2 / 9
Zinc	21 / 22	Human Health Resource Damage Aquatic Ecological	1 / 22 1 / 22 2 / 22	1 / 11 1 / 11 2 / 11
Antimony	5 / 22	Human Health	3 / 22	2 / 11
Copper	19 / 22	Human Health Resource Damage Aquatic Ecological	1 / 22 1 / 22 4 / 22	1 / 11 1 / 11 2 / 11
Mercury	3 / 24	Aquatic Ecological	1 / 24	1 / 10
Thallium	1 / 20	Human Health	1 / 20	1 / 10

(a) Constituents listed in this table are present in at least one sample from at least one facility at a concentration that exceeds a relevant screening criterion. The conservative screening criteria used in this analysis are listed in Exhibit 2-3. Constituents that were not detected in a given sample were assumed not to be present in the sample. The constituent concentrations used for this analysis are based on EP leach test results.

(b) Human health screening criteria are based on cancer risk or noncancer health effects. "Human health" screening criteria noted with an "*" are based on $1x10^{-6}$ lifetime cancer risk; others are based on noncancer effects.

These exceedances of the screening criteria have the following implications:

- Concentrations of arsenic, lead, cadmium, chromium, fluoride, zinc, antimony, copper, and thallium in phosphogypsum leachate exceed screening criteria based on human health risks. This indicates that, if phosphogypsum leachate were diluted less than 10-fold during migration to a drinking water exposure point, long-term chronic ingestion could cause adverse health effects due to the presence of these constituents. The concentration of arsenic in diluted phosphogypsum leachate could pose a cancer risk of greater than $1x10^{-5}$ from long-term drinking water exposures.

- Concentrations of phosphorus, lead, phosphate, nickel, iron, cadmium, chromium, silver, zinc, copper, and mercury in phosphogypsum leachate exceed screening criteria for protection of aquatic life. This means that phosphogypsum leachate could present a threat to aquatic organisms if it migrates (with less than 100-fold dilution) to surface waters.

- Lead, manganese, molybdenum, nickel, iron, cadmium, chromium, zinc, and copper concentrations in phosphogypsum leachate exceed ground and surface water resource damage screening criteria. This indicates that, if released and diluted by a factor of 10 or less, leachate from this waste may contain these constituents in concentrations sufficient to severely restrict the potential future uses of nearby ground and surface water resources.

These exceedances of the screening criteria, by themselves, do not demonstrate that phosphogypsum poses a significant risk, but rather indicate that it may present a hazard. To determine the potential for phosphogypsum to cause significant impacts, EPA proceeded to analyze the actual conditions that exist at the facilities that generate and manage the waste (see the following section on release, transport, and exposure potential).

Process Wastewater Constituents of Potential Concern

Using the same process summarized above for phosphogypsum, EPA identified chemical constituents in phosphoric acid process wastewater that could conceivably pose a risk by collecting data on the composition of this waste, and evaluating the intrinsic hazard of the chemical constituents present in the process wastewater.

Data on Process Wastewater Composition

EPA's characterization of process wastewater and its leachate is based on data from: (1) a 1989 sampling and analysis effort by EPA's Office of Solid Waste (OSW), and (2) industry responses to a RCRA §3007 request. These data provide information on the concentrations of 21 metals, radium-226, uranium-238, gross alpha and gross beta radiation, a number of other inorganic species (i.e., chloride, fluoride, phosphate, nitrate, sulfate, and ammonia), and seven organic compounds in total and leach test analyses. Data on the pH of process wastewater was also collected: at most facilities, the pH is between 1 and 2 standard units, however, two facilities report minimum levels below 1, and 1 facility reports levels between 6.5 and 8 standard units. The waste composition data represent samples collected from 17 of the 21 active phosphoric acid production facilities. As with the concentration data for phosphogypsum, data on the concentrations of most constituents in process wastewater vary over two or three orders of magnitude. Concentrations from leach test analyses of the wastewater vary to a smaller extent.

Concentrations of most (i.e., 22 of 40) constituents in total analyses of process wastewater vary considerably among the samples analyzed (i.e., the range of values spans more than three orders of magnitude). Concentration data provided by industry represent a larger number of samples and span a wider range of values than do data from EPA's sampling and analysis efforts. Concentrations of most constituents in leach test analyses of process wastewater vary considerably less than do concentrations in total analyses (i.e., the ranges of values span two or three orders of magnitude for only five constituents). Because the waste characterization provided by total analyses and leach test analyses are similar, and because the quantity of data is much greater for total analyses, the following analysis of potential constituents of concern in process wastewater is based on the results of total analyses only.

Identified Constituents of Potential Concern

Exhibit 12-5 presents the results of the comparisons for the phosphoric acid process wastewater total analyses to the screening criteria described above. This exhibit lists all constituents for which at least one sample concentration exceeds a relevant screening criterion.

Of the 40 constituents analyzed in process wastewater (and its leachate), levels of arsenic, phosphorus, phosphate, cadmium, chromium, aluminum, gross alpha and beta radiation, radium-226, phenol, iron, manganese, nickel, lead, vanadium, sulfate, copper, boron, molybdenum, antimony, thallium, silver, cobalt, mercury, fluoride, zinc, chloride, beryllium, selenium, and pH exceed the Agency's screening criteria. All of these constituents are metals or other inorganics that do not degrade in the environment.

The first 22 of these 30 constituents are of relatively greater potential concern because their concentrations in samples from at least one-half of all facilities analyzed exceed screening criteria (based on separate evaluations of total liquid and leach test results). Maximum concentrations of phosphorus, phosphate, arsenic, and phenol exceed screening criteria by factors of greater than 1,000 and concentrations of 15 other constituents exceed screening criteria by factors of at least 10. As discussed in Section 12.2, cadmium, chromium, and selenium concentrations are occasionally greater than or equal to the EP toxicity regulatory levels, and the pH is frequently below 2.0, the lower-bound limit for defining a corrosive waste.

These exceedances of the screening criteria indicate the potential for the following types of impacts under the following conditions:

- Concentrations of arsenic, cadmium, chromium, radium-226, lead, vanadium, copper, antimony, thallium, fluoride, and selenium in process wastewater exceed screening criteria based on human health risks. This indicates that, if process wastewater was diluted 10-fold during migration to a drinking water exposure point, long-term exposures could cause adverse health effects due to the presence of these constituents. Based on long-term drinking water exposures, arsenic concentrations could pose a significant cancer threat (i.e., a lifetime risk of greater than $1x10^{-5}$).
- Concentrations of arsenic, cadmium, chromium, aluminum, gross alpha and beta radiation, radium-226, phenol, iron, manganese, nickel, lead, vanadium, sulfate, copper, boron, molybdenum, cobalt, silver, fluoride, chloride, beryllium, and selenium in process wastewater exceed ground and surface water resource damage screening criteria. This indicates that, if released and diluted less than 10-fold in ground water or less than 100-fold in surface water, phosphoric acid process wastewater may contain these constituents in concentrations sufficient to severely restrict the uses of nearby ground- and surface water resources. In addition, the pH of phosphoric acid plant process wastewater is very low, and water resources may be damaged by the highly acidic nature of this waste.
- Concentrations of arsenic, phosphorus, phosphate, cadmium, chromium, aluminum, iron, nickel, lead, copper, silver, mercury, zinc, and selenium in process wastewater exceed screening criteria based on aquatic life protection. The low pH of the wastewater is also well below the levels that most aquatic life can tolerate. This means that phosphoric acid plant process wastewater may present a threat to aquatic organisms if it migrates (with 100-fold dilution) to surface waters.

These exceedances, by themselves, do not prove that the wastewater poses a significant risk, but rather indicate that it may present a hazard under a very conservative, hypothetical set of release, transport, and exposure conditions. To determine the potential for this waste to cause significant impacts, EPA proceeded to the next step of the risk assessment to analyze the actual conditions that exist at the facilities that generate and manage the wastewater.

Exhibit 12-5
Potential Constituents of Concern in Phosphoric Acid Process Wastewater (Total)[a]

Potential Constituents of Concern	No. of Times Constituent Detected/No. of Analyses for Constituent	Screening Criteria[b]	No. of Analyses Exceeding Criteria/ No. of Analyses for Constituent	No. of Facilities Exceeding Criteria/ No. of Facilities Analyzed for Constituent
Arsenic	77 / 78	Human Health*	76 / 78	15 / 15
		Resource Damage	37 / 78	8 / 15
		Aquatic Ecological	21 / 78	5 / 15
Phosphorus	31 / 31	Aquatic Ecological	31 / 31	10 / 10
Phosphate	38 / 38	Aquatic Ecological	38 / 38	9 / 9
Cadmium	73 / 77	Human Health	65 / 77	14 / 15
		Resource Damage	69 / 77	14 / 15
		Aquatic Ecological	68 / 77	14 / 15
Chromium	75 / 78	Human Health	28 / 78	8 / 15
		Resource Damage	65 / 78	14 / 15
		Aquatic Ecological	44 / 78	9 / 15
Aluminum	58 / 59	Resource Damage	42 / 59	8 / 10
		Aquatic Ecological	53 / 59	10 / 10
Gross Alpha	46 / 47	Resource Damage	40 / 47	11 / 11
Gross Beta	34 / 47	Resource Damage	30 / 47	9 / 9
Radium-226	86 / 89	Human Health*	28 / 89	9 / 13
		Resource Damage	14 / 89	6 / 13
Phenol	4 / 5	Resource Damage	4 / 5	3 / 3
Iron	54 / 55	Resource Damage	52 / 55	10 / 10
		Aquatic Ecological	33 / 55	6 / 10
Manganese	44 / 44	Resource Damage	41 / 44	10 / 10
Nickel	68 / 72	Resource Damage	14 / 72	8 / 14
		Aquatic Ecological	57 / 72	12 / 14
Lead	64 / 75	Human Health	28 / 75	8 / 15
		Resource Damage	51 / 75	12 / 15
		Aquatic Ecological	22 / 75	7 / 15
Vanadium	38 / 41	Human Health	18 / 41	5 / 10
		Resource Damage	30 / 41	9 / 10
Sulfate	57 / 57	Resource Damage	43 / 57	10 / 11
Copper	68 / 74	Human Health	1 / 74	1 / 14
		Resource Damage	1 / 74	1 / 14
		Aquatic Ecological	37 / 74	7 / 14

(a) Constituents listed in this table are present in at least one sample from at least one facility at a concentration that exceeds a relevant screening criterion. The conservative screening criteria used in this analysis are listed in Exhibit 2-3. Constituents that were not detected in a given sample were assumed not to be present in the sample.

(b) Human health screening criteria are based on cancer risk or noncancer health effects. "Human health" screening criteria noted with an "*" are based on 1×10^{-6} lifetime cancer risk; others are based on noncancer effects.

Exhibit 12-5 (cont'd)
Potential Constituents of Concern in Phosphoric Acid Process Wastewater (Total)[(a)]

Potential Constituents of Concern	No. of Times Constituent Detected/No. of Analyses for Constituent	Screening Criteria[(b)]	No. of Analyses Exceeding Criteria/ No. of Analyses for Constituent	No. of Facilities Exceeding Criteria/ No. of Facilities Analyzed for Constituent
Boron	2 / 2	Resource Damage	1 / 2	1 / 1
Molybdenum	34 / 39	Resource Damage	27 / 39	10 / 10
Antimony	27 / 70	Human Health	10 / 70	6 / 14
Thallium	18 / 56	Human Health	18 / 56	5 / 13
Cobalt	35 / 41	Resource Damage	7 / 41	3 / 10
Silver	43 / 73	Aquatic Ecological	12 / 73	5 / 14
Mercury	45 / 74	Aquatic Ecological	6 / 74	4 / 14
Fluoride	53 / 53	Human Health Resource Damage	3 / 53 1 / 53	1 / 12 1 / 12
Zinc	77 / 77	Aquatic Ecological	9 / 77	3 / 14
Chloride	26 / 26	Resource Damage	2 / 26	1 / 6
Beryllium	66 / 71	Resource Damage	2 / 71	1 / 14
Selenium	56 / 73	Human Health Resource Damage Aquatic Ecological	1 / 73 2 / 73 2 / 73	1 / 14 1 / 14 1 / 14
pH	68 / 68	Resource Damage	59 / 68	13 / 14

(a) Constituents listed in this table are present in at least one sample from at least one facility at a concentration that exceeds a relevant screening criterion. The conservative screening criteria used in this analysis are listed in Exhibit 2-3. Constituents that were not detected in a given sample were assumed not to be present in the sample.

(b) Human health screening criteria are based on cancer risk or noncancer health effects. "Human health" screening criteria noted with an "*" are based on 1×10^{-6} lifetime cancer risk; others are based on noncancer effects.

Release, Transport, and Exposure Potential

This analysis evaluates the baseline hazards of phosphogypsum and phosphoric acid plant process wastewater as it was generated and managed at the 21 phosphoric acid facilities in 1988. It does not assess the hazards of off-site use or disposal of these wastes or the risks associated with variations in waste management practices or potentially exposed populations in the future because of a lack of data on off-site and projected future conditions.

EPA has identified a variety of documented cases of dangers posed by the release of constituents from these wastes to the environment, and EPA's Office of Air and Radiation (OAR) has studied air pathway risks (from radionuclides) posed by these wastes. Consequently, the Agency has used information on documented and potential damages from these other analyses to support its evaluation of the release, transport, and exposure potential of the current management of these wastes.

Ground-Water Release, Transport, and Exposure Potential

Section 12.3.2 describes documented cases of ground-water contamination at seven phosphoric acid plants located in Central Florida (3), Louisiana (2), North Carolina (1), and Idaho (1). These cases indicate that phosphogypsum and process wastewater constituents have been released to ground water at a number of facilities and, at some sites, have migrated off-site to potable wells in concentrations that are well above hazard criteria. Based on the analysis of the damage case evidence, presented below, EPA concludes that management of phosphogypsum and process wastewater in stacks and ponds can release contaminants to the subsurface, and depending on the hydrogeologic setting and ground-water use patterns, threaten human health via drinking water exposures or render ground-water resources unsuitable for potential use.

In the following paragraphs, EPA presents a region-by-region assessment of the hazards posed by phosphogypsum and process wastewater management. For purposes of this discussion, phosphoric acid plants are grouped into the following eight regions: Central Florida, North Carolina, Louisiana, Idaho, North Florida, Mississippi, Texas, and Wyoming. For each region for which ground-water damages have been documented, the Agency first builds the case that damages attributable to waste management have occurred, then, to the extent necessary, uses environmental setting information to assess the potential hazards (i.e., health risks and resource damage potential) at other facilities in the region. When no damage case information is available for a region, evidence of release potential is used in conjunction with environmental setting information to assess the hazards of potential releases from the plants in these regions.

Central Florida. The Florida Department of Environmental Regulation has initiated enforcement actions in response to ground-water contamination associated with the management of phosphogypsum and process wastewater at all 11 active phosphoric acid production facilities in Central Florida. At three of these facilities (i.e., Central Phosphates, Seminole, and IMC) contamination of the useable intermediate or Floridan aquifers exceeds primary drinking water standards for pH, gross alpha radiation, radium, sodium, total dissolved solids, sulfate, cadmium, chromium, fluoride, and arsenic beyond the permitted zone of discharge.[7] With the exception of sodium and total dissolved solids, all of these constituents were identified as potential constituents of concern in phosphogypsum or process wastewater. At the other eight facilities, contamination exceeding drinking water standards beyond the permitted zone of discharge has been detected only in the surficial aquifer. Two of the three damage cases for Central Florida phosphoric acid production plants presented in Section 12.3.2 (i.e., Central Phosphates and Seminole) discuss contamination of off-site ground water in formations that are used for water supplies. At Central Phosphates, a ground-water contamination plume in the Floridan aquifer extends six acres beyond the facility boundary; contamination of the surficial aquifer covers 28 acres outside the facility boundary. Twelve of 18 potable supply wells down-gradient of the Seminole plant sampled in 1988 contained at least one constituent at a concentration in excess of a drinking water standard. The owner of the phosphoric acid plant paid to have the affected properties connected to a public water supply. These ground-water contamination incidents indicate a high potential for ground-water releases from the phosphoric acid production plants in Central Florida. Except for the Gardinier facility, all operating plants in this area are within 1,000 meters of a public supply well and contamination of the Floridan aquifer at these sites could pose a public health threat via drinking water exposures. As demonstrated by the damage cases and violations of drinking water standards beyond the permitted zone of discharge, contaminants from these wastes can reach the useable aquifer in this area and migrate down-gradient toward potential exposure points.

North Carolina. Section 12.3.2 discusses ground-water contamination resulting from management of process wastewater at the phosphoric acid plant in Aurora, North Carolina. The extent of ground-water contamination at this site is not known with certainty, but fluoride and total dissolved solids concentrations in on-site wells exceed state drinking water standards in the surficial aquifer that is not extensively used and

[7] The State of Florida allows discharges to ground water within a defined "zone of discharge." The horizontal extent of the zone typically is limited to the property boundary.

in an intermediate aquifer that is useable, but not developed in the vicinity of the site. No contamination has been detected in a deeper aquifer that serves as the principal water supply in this area. Although off-site migration of contaminants and contamination of the principal water supply aquifer have not been documented, exposures could occur if contaminated drinking water were withdrawn from the surficial aquifer at nearby residences (as close as 100 meters). Even though ground water in the surficial and intermediate aquifers is not currently used as a drinking water source, the documented contamination may render ground water beneath the facility, and possibly down-gradient of the facility, unsuitable for potential future uses.

Louisiana. Documented cases of ground-water damages from phosphogypsum and process wastewater management at two plants in Louisiana are presented in Section 12.3.2. Data provided in the damage cases indicates that ground water beneath the Geismar facility is contaminated with gross alpha radiation at concentrations more than six times the federal primary drinking water standard. In addition, the Louisiana Department of Environmental Quality concluded in 1986 that "contamination of the shallow ground water [at Donaldsonville], although by constituents which are not of great concern, poses a threat to drinking water."[8] Current human health threats via drinking water at the Donaldsonville and Geismar facilities are unlikely because there are no private residences or public wells that derive drinking water supplies within 1,600 meters (1 mile) down-gradient of these facilities. However, ground-water releases are also likely at the third active Louisiana plant (Uncle Sam), and potential exposures to contaminated ground water could occur at a residence located 180 meters down-gradient from this facility.

Idaho. One of the two phosphoric acid plants in Idaho is discussed in a damage case in Section 12.3.2. Although this damage case does not provide conclusive evidence of long-term ground-water contamination from releases of phosphogypsum and process wastewater, data presented indicate that a few constituents of concern for these wastes (e.g., selenium, manganese, sulfate, and phosphate) may be contaminating ground water down-gradient of the Caribou facility. Because of relatively high levels of background contamination, a recent geophysical survey at Caribou did not delineate a ground-water contamination plume originating at the plant. Nevertheless, selenium concentrations exceed federal secondary drinking water standards at on-site and down-gradient off-site production wells, and phosphate concentrations at a down-gradient off-site production well exceed background levels by a factor of 170. Both of these constituents are found in process wastewater, and a recent EPA site inspection report concludes that the ground-water monitoring data "suggest that some leakage from the [process wastewater] cooling pond may be occurring presently."[9] In addition to this evidence of continuing contamination of the useable aquifer, the Caribou damage case discusses a spill of process wastewater, resulting from a dike failure, that contaminated off-site ground water with cadmium (at a concentration more than four times the federal drinking water standard), phosphate, and fluoride. Consequently, EPA concludes that typical management of phosphogypsum and process wastewater in Idaho may allow the continuous seepage of contaminants to ground water, and mismanagement (i.e., spills) of process wastewater has caused ground-water contamination. Any ground-water contamination that does occur as a result of waste management at the two Idaho facilities could pose human health threats at residences located 240 and 850 meters down-gradient of the Caribou and Pocatello plants, respectively.

North Florida and Mississippi. Although not demonstrated in the documented damage cases, ground-water contamination potential also appears to be relatively high at the plants in North Florida and Mississippi. As with the Central Florida facilities, the White Springs facility in North Florida is in karst terrane (characterized by sinkholes and underground cavities developed by the dissolution of carbonate rock such as limestone) which creates the potential for contaminant transport with limited dilution. Releases at

[8] Louisiana Department of Environmental Quality. 1986. Letter from George H. Cramer, II, Administrator to Susan Stewart, Agrico Manager Energy and Environmental Control, Re: Hydrogeologic Assessment, Final Report GD-093-0791.

[9] EPA Region 10. 1988. *Site Inspection Report to Nu-West Industries. Conda Plant, Caribou, Idaho. TDD F10-8702-08.*

this plant could result in exposures at a residence located 180 meters down-gradient. Ground-water contamination potential appears high at the Pascagoula plant in Mississippi because ground water occurs at a depth of only 1.5 meters in this area. Human populations are not likely to be exposed to potential ground-water contaminants at this facility, however, because currently there are no residences or public supply wells within 1,600 meters down-gradient from the facility.

Texas and Wyoming. The potential for ground-water pathway risks at the Texas and Wyoming facilities is relatively low. Releases from the management units at the plant in Pasadena, Texas are limited to some extent because the stack at this facility is lined with recompacted local clay, and exposures to existing populations are unlikely because there is no residence or public supply well within 1,600 meters down-gradient from the facility. Similarly, the facility in Rock Springs, Wyoming poses a relatively low risk because its stack has a synthetic liner and the nearest down-gradient residence is quite distant (greater than 1,600 meters).

Surface Water Release, Transport, and Exposure Potential

The potential for the release of contaminants from phosphogypsum stacks and process wastewater ponds to surface water is also demonstrated by the damage cases presented in Section 12.3.2. These cases indicate that phosphogypsum and process wastewater management at plants in Central Florida, North Carolina, and Louisiana has resulted in the release of waste constituents to surface waters. Based on the analysis of the damage case evidence, it is clear that management of phosphogypsum and process wastewater in stacks and ponds can, and does, release contaminants to nearby surface waters. Depending on the distance to surface waters, the hydrogeologic setting, and surface water use patterns, EPA concludes that there is a potential for these released contaminants to migrate off-site and threaten human health via drinking water exposures, threaten aquatic life, or render surface water resources unsuitable for potential consumptive uses.

In the following paragraphs, EPA presents a region-by-region assessment of the hazards to surface water quality posed by phosphogypsum and process wastewater management. For each region for which surface water releases have been documented, the Agency first builds the case that releases from waste management units have occurred in the past and are typical of current practices, then uses environmental setting information to assess the potential hazards (i.e., health risks, risk to aquatic organisms, and resource damage potential) at other facilities in the region. When no damage case information is available for a region, evidence of release potential is used in conjunction with environmental setting information to assess the hazards of potential releases from the plants in these regions.

Central Florida. The damage cases presented in Section 12.3.2 indicate that unpermitted discharges of process wastewater and/or phosphogypsum stack seepage to surface waters have occurred at the Gardinier and Seminole plants in Central Florida. At the Gardinier facility, a number of releases from 1984 to 1988 have been documented. Releases to surface water from solid waste management at this plant arise from the discharge of untreated stack seepage from a drain system that is designed to intercept and collect leachate and effluent flowing laterally away from the stack. As indicated in the damage cases, fluorides, phosphorus, and radioactive substances are present at concentrations of concern in the effluent from this drain system. In addition, these unpermitted discharges had a pH of 1.5 to 2.2. In 1988, county and state inspectors discovered damaged vegetation on the shoreline of Hillsborough Bay along the west side of the gypsum stack where an unpermitted discharge was occurring. The affected area -- approximately one-half acre of saltwater marshes and wax myrtle -- had turned a brownish color,[10] presumably as a result of the discharge of untreated stack seepage. At the Seminole facility, surface water contamination has occurred via an unpermitted discharge to Bear Branch. Similar releases, or releases of contaminated ground-water discharging to surface water, could also occur at the eight other facilities in this area that are located near surface waters. At two of these

[10] Hillsborough County Environmental Protection Commission. October 6, 1988. Memorandum from Roger Stewart, Director, to Pam Iorio, Commissioner.

facilities (i.e., Central Phosphates and IMC), the nearby river is used as a source of drinking water downstream of the facility and releases to these rivers could pose a human health threat via drinking water exposures. Of the 11 active Central Florida plants, only Royster/Mulberry is not within 1,000 meters of surface water and is unlikely to pose a threat to surface water resources.

North Carolina. As at the Gardinier plant, unpermitted discharges of stack drainage and process wastewater from the plant in Aurora, North Carolina are also associated with failure of the drain system designed to collect seepage at the foot of the gypsum stacks. In two separate incidents in 1980 and one in 1987, concentrations of fluoride and phosphorus released from the plant exceeded permit limits as a result of drainage ditch and dike failure and drain overflow. In the 1987 episode, the pH of a freshwater canal was below 6.0 for two hours and 18 dead fish were discovered in the week following the release. Based on this evidence, the Agency concludes that episodic releases from the phosphogypsum stack and ponds at this facility were not adequately controlled by run-on/run-off controls and collection of stack seepage. In addition, contaminants released to ground water may discharge to the Pamlico River and to the creeks in the vicinity of the site where they may endanger aquatic life.

Louisiana. Two documented cases of surface water damages from phosphogypsum and process wastewater management in Louisiana are presented in Section 12.3.2. At both the Donaldsonville and Geismar plants, releases occurred as a result of the emergency discharge of untreated water from gypsum stacks and ponds to surface waters. As noted in the damage cases, the facility operators claimed that these discharges were necessitated by excess precipitation that threatened to cause stack failures. Emergency discharges are permitted at facilities on the lower Mississippi during periods of excess precipitation. As discussed above, ground-water contamination potential is also significant at the three facilities in Louisiana, and ground water discharging to surface waters may provide another means of contaminant release. The threats posed by releases to surface waters in Louisiana may be limited somewhat by the large flow of the Mississippi River. Because the Mississippi River is not used as a source of drinking water directly downstream of the three phosphoric plants, releases from these plants do not pose any current human health threats.

Based on the evidence presented above, EPA concludes that constituents of phosphogypsum and process wastewater that are managed near surface water bodies are likely to be released to nearby surface waters as a result of stack failures, drain failure, and possibly ground-water seepage. The facilities in Pasadena, Texas; Pascagoula, Mississippi; and White Springs, Florida (north) are located close to surface waters and receive relatively large quantities of precipitation. Consequently, these plants may present a hazard to surface water similar to that of the Louisiana and Central Florida facilities. The surface water contamination potential at the plant in Pocatello, Idaho is somewhat lower because the small amount of precipitation limits ground-water recharge and the possibility of stack failure due to excess precipitation, but contamination of the Portneuf River (located only 240 meters away) may occur. Surface water contamination is unlikely at the plants in Rock Springs, Wyoming and Caribou, Idaho because of the relatively small amounts of annual precipitation (i.e., 20 to 35 cm/year) and the large distances to the nearest surface water (370 to 2,600 meters).

Air Release, Transport, and Exposure Potential

Air pathway hazards associated with phosphogypsum and process wastewater relate primarily to the emission of radon gas from the radioactive decay of radium found in these wastes and the emission of particulate matter resulting from the disturbance of the phosphogypsum stack surface.

In support of a rulemaking on national emission standards for radionuclides, EPA's Office of Air and Radiation (OAR) has assessed the risks of radon emissions from phosphogypsum stacks.[11] In this risk

[11] U.S. EPA. 1989, Risk Assessments: Environmental Impact Statement for NESHAPS Radionuclides, Volume 2 (Background Information Document), Office of Radiation Programs.

assessment, OAR estimates that the lifetime cancer risk to the maximally exposed individual (MEI) caused by the inhalation of radon in the vicinity of a phosphogypsum stack is $9x10^{-5}$. The MEI lifetime cancer risk from radon inhalation is greater than or equal to $1x10^{-5}$ at 17 of the 21 active phosphoric acid facilities. Only the plants in Pascagoula, Mississippi; Aurora, North Carolina; Rock Springs, Wyoming; and White Springs, Florida have an estimated MEI lifetime cancer risk from radon inhalation of less than $1x10^{-5}$.

Because phosphogypsum forms a crust on inactive areas of the stack as it dries, and because the active areas of the stack are moist, the emission of particulate matter by wind erosion is not thought to be a significant release mechanism.[12] Physical disturbance of dried phosphogypsum (e.g., by vehicles driving over the stacks), however, may be an important particle release mechanism. The OAR risk assessment estimated that the lifetime cancer risks from radionuclides in particle emissions from stacks range from $8x10^{-8}$ to $2x10^{-6}$. Based on these risk estimates, the OAR assessment concludes that the risk from inhaling radon emitted from phosphogypsum stacks is approximately two orders of magnitude greater than the cancer risk posed by the inhalation of fugitive dust from phosphogypsum stacks.

The OAR study did not investigate the cancer risk posed by other toxic constituents (i.e., arsenic and chromium) in phosphogypsum via particle inhalation. To supplement OAR's radiological assessment, EPA performed a screening level analysis of the risks posed by arsenic and chromium blown from phosphogypsum stacks. Using typical concentrations of arsenic and chromium in phosphogypsum, EPA calculated a lifetime cancer risk of $7x10^{-7}$ from exposure to these constituents in windblown phosphogypsum.[13] This analysis shows that the risk posed by arsenic and chromium in inhaled phosphogypsum particles is on the order of 35 percent of the risk posed by radionuclides in inhaled particles.

Based on the these findings, the Agency concludes that phosphogypsum stacks pose a considerable air pathway cancer risk primarily as a result of radon emissions from the stacks. By summing the risk estimates for radon inhalation, radionuclides in phosphogypsum particles, and arsenic and chromium in particles, EPA estimates a total air pathway lifetime MEI cancer risk of approximately $9x10^{-5}$ from exposure to phosphogypsum constituents. This risk is primarily from inhalation of radon emitted from stacks ($9x10^{-5}$) with minor contributions from the inhalation of phosphogypsum particles containing radionuclides ($2x10^{-6}$) and arsenic and chromium ($7x10^{-7}$). Based on the OAR estimates of risk from radon emitted from the stacks, the following plants appear to pose the greatest air pathway risks: Pasadena, Texas; Royster/Palmetto; Uncle Sam, Louisiana; Seminole; Central Phosphate; and Caribou, Idaho. As mentioned above, the stacks at Pascagoula, Mississippi; Aurora, North Carolina; Rock Springs, Wyoming; and White Springs, Florida pose lower MEI lifetime cancer risk (i.e., $< 1x10^{-5}$).

Proximity to Sensitive Environments

Eighteen of the 21 active U.S. phosphoric acid plants are located in or near environments that are vulnerable to contaminant release or that have high resource value. In particular:

- The Seminole facility reported in its response to the National Survey on Solid Wastes from Mineral Processing Facilities that it is located in an endangered species habitat.
- The Royster/Palmetto and Pascagoula facilities are located within 6.5 and 7.8 miles, respectively, of the critical habitat of an endangered species. The two endangered species are the Florida Manatee and the Mississippi Sandhill Crane. Because of the

[12] Ibid. p. 13-2.

[13] This risk estimate is based on a comparison of the dust inhalation risks posed by (1) median arsenic and chromium concentrations as determined by EPA's data base developed for this study and (2) average concentrations of radium-226, uranium-234, uranium-238, thorium-230, polonium-210, and lead-210 presented in the OAR analysis. To calculate the relative risks posed by these constituent concentrations, EPA assumed an exposure point concentration of windblown phosphogypsum in air, and applied standard cancer slope factors and exposure assumptions, such as those used in developing the screening criteria (see Section 2.2.2), to estimate the relative contributions of carcinogenic metals and radionuclides to the inhalation risks posed by airborne phosphogypsum.

relatively large distance to these protected areas, the potential for impacts on the species or their critical habitat is quite low.

- Eight plants (i.e., Geismar, CF Chemicals, Gardinier, Pocatello, Pasadena, Pascagoula, Seminole, and Aurora) are located in 100-year floodplains. Management of wastes in floodplains creates the potential for large, episodic releases caused by flood events. (The effectiveness of flood control structures at these plants is not known.)

- The Gardinier, Pascagoula, and Aurora plants are located in a wetland (defined here to include swamps, marshes, bogs, and other similar areas). The Agrico/Mulberry, Geismar, Central Phosphates, CF Chemicals, Conserv, Royster/Palmetto, Farmland, Fort Meade, IMC, Caribou, White Springs, Royster/Mulberry, and Seminole plants are located within one mile of a wetland. Wetlands are commonly entitled to special protection because they provide habitats for many forms of wildlife, purify natural water, provide flood and storm damage protection, and afford a number of other benefits. Although the location of wetlands relative to potential contaminant sources is unknown, if contaminants released to surface water and ground water migrate to wetlands, the water quality degradation may adversely affect the wetland.

- The Pocatello facility is located in a fault zone. Wastes managed in a fault zone may be subject to episodic releases due to earthquake-induced failure of containment systems or berms.

- The Central Phosphates and Royster/Palmetto facilities are located in an area of karst terrain characterized by sinkholes and underground cavities developed by the dissolution of carbonate rock. Solution cavities that may exist in the bedrock at this site could permit any ground-water contamination originating from the wastes to migrate in a largely unattenuated and undiluted fashion.

Risk Modeling

Based upon the evaluation of intrinsic hazard and the descriptive analysis of factors that influence risk presented above, EPA has concluded that the potential for phosphogypsum and process wastewater from phosphoric acid production to impose risk to human health or the environment is significant, if managed according to current practice. As discussed above,

- Phosphogypsum and phosphoric acid process wastewater contain a number of constituents at concentrations that exceed conservative screening criteria, phosphogypsum occasionally contains chromium concentrations in excess of the EP toxicity regulatory level, and process wastewater regularly exhibits the RCRA hazardous waste criterion for corrosivity (i.e., pH below 2.0) and exceeds EP regulatory levels for cadmium, chromium, and selenium.

- Ground-water contamination from phosphogypsum stacks and process wastewater ponds has occurred or is likely at almost all plants, and, at some sites, contamination has reached off-site wells at levels above drinking water standards.

- Episodic and continuous releases of pond and phosphogypsum stack waters to surface water occur at a number of plants, and aquatic organisms have been adversely affected by these releases.

- Radon emissions from phosphogypsum stacks and windblown phosphogypsum particles are estimated to present a lifetime cancer risk to maximally exposed individuals of almost $1x10^{-4}$.

Because of the weight of the empirical and analytical evidence summarized above, the Agency did not conduct a quantitative risk modeling exercise addressing these wastes. Section 12.3.3 provides a more detailed discussion of the Agency's conclusion that current management of phosphogypsum and phosphoric acid process wastewater poses a significant hazard.

12.3.2 Damage Cases

EPA conducted waste management case studies to assess the impacts of phosphogypsum and process wastewater management practices on human health and the environment. This review included 21 active and eight inactive phosphoric acid facilities. The inactive facilities are: Agrico, Hahnville, LA; Agrico, Fort Madison, IA; Albright & Wilson, Fernald, OH; JR Simplot, Helm, CA; Mobil Mining & Minerals, De Pue, IL; U.S. Agri-Chemicals Corp., Bartow, FL; Waterway Terminals, Helena, AR; and MS-Chemical located in Pascagoula, Mississippi. Documented damages attributable to management of phosphogypsum or process wastewater have been documented at more than ten facilities. Selected facilities are discussed in detail below.

Several factors play an important role in influencing the effectiveness of typical phosphogypsum and process wastewater management practices. Among these are water balance and soil stability. In Florida, for example, phosphogypsum dewatering and reduction of wastewater volumes are made possible due to the climate, specifically the relative amounts of precipitation and evaporation, in this region. In other areas, however, such as Louisiana, a net precipitation surplus necessitates a system dependent on planned discharges to surface waters. Soil stability appears to be much greater in Florida as well, where gypsum may be stacked to heights up to 60 meters (200 feet). In Louisiana, gypsum piles over 12 meters in height are generally considered unstable. In light of these differences, the case studies presented in this section are grouped by state.

Idaho

Nu-West Industries-Conda, Soda Springs, Idaho

The Nu-West plant is located approximately five miles north of Soda Springs, Idaho, near the abandoned mining town of Conda. The site covers approximately 650 hectares (1,600 acres). With the exception of a period from 1985 to 1987, the plant has been in operation since 1964.

Currently, Nu-West formulates and markets phosphate-based chemicals and fertilizers. The phosphogypsum waste is a by-product of the digester system, which produces ortho-phosphoric acid (P_2O_5) from phosphate ore. Gypsum is slurried with process water and pumped to two storage ponds on top of the gypsum stacks, which have been in use since 1964 and presently cover approximately 240 to 280 hectares (600 to 700 acres). The gypsum ponds are unlined; the stacks are about 46 meters (150 feet) above the natural ground surface. Drainage systems decant slurry water off the top of the higher ponds into ponds at lower elevations.

During March 1976, a dike surrounding the Nu-West cooling pond failed and released 400 acre feet of wastewater into the surrounding area. The water spread out and ponded on an estimated 20 to 40 hectares (50 to 100 acres) of farm land. The water then migrated via a natural drainage path, forming a small river that extended four miles to the south. Wastewater reportedly infiltrated into local soil and underlying bedrock along its overland migration path, but never entered a natural surface water body.

While the Idaho Division of Environment determined that dilution during spring run-off reduced surface concentrations of contaminants to within acceptable limits, the Caribou County Health Department recorded significant increases in ground-water concentrations of phosphate, cadmium, and fluoride immediately following the spill. Samples from a J.R. Simplot Company (Conda Operation) production well No. 10, located down-gradient from the Nu-West facility, show that before the spill occurred, levels of phosphate in the ground water averaged 100 mg/L, and rose to 1,458 mg/L after the spill. Levels of cadmium in the ground water averaged 0.01 mg/L before the spill and 0.239 mg/L after the spill, and levels of fluoride averaged 5 mg/L before, and 39 mg/L after, the spill, respectively.[14]

[14] EPA Region 10. 1988. Site Inspection Report to Nu-West Industries Conda Plant, Caribou, Idaho. TDD F10-8702-08. March, 1988.

In 1987, EPA Region X conducted a file review and site inspection of Nu-West. This inspection included ground-water sampling, aqueous and solid sampling from the waste ponds, and a geophysical survey. A total of six ground-water samples were collected: two from on-site industrial production wells (MF well, P.W. No. 1); two off-site industrial production wells (Simplot No. 11, Simplot No. 10); and, two domestic wells in the site area. Results of the Nu-West site inspection were published in a site inspection report in March, 1988. Selenium exceeded Federal Primary Drinking Water Standards in all of the production well samples. Manganese and sulfate exceeded Federal Secondary Drinking Water Standards in Simplot Well No. 10. Phosphate was detected at 8.2 mg/L in Simplot Well No. 10, a level approximately 30 times greater than that found in the MF well and 170 times greater than that found in the background well (Simplot Well No. 11). A total of eleven target compound list (TCL) inorganic elements were detected in at least one of the domestic well samples; however, none of the sample concentrations exceeded Federal Primary or Secondary Drinking Water Standards.[15]

The geophysical survey results indicated that there was no significant difference between the background and on-site values obtained from the survey. However, as stated in the EPA Site Inspection Report: "There are seven registered domestic wells within a three mile radius of the Nu-West site, serving an estimated 27 people. Total depths of these wells range between 90 feet to 245 feet below ground surface. Eleven registered industrial production wells exist on and near the Nu-West site, one of which provides drinking water for approximately 45 J.R. Simplot employees in Conda (Simplot #11). At the time of the [EPA] inspection, Nu-West employees consumed bottled water due to poor water quality of the only well in use at the site (MF well)."[16]

The EPA Site Inspection Report concludes by stating: "Levels of TCL inorganic elements and anions detected in the groundwater samples during the [EPA] site investigation were similar to those obtained by the Caribou County Health Department during non-spill event time periods. However, the levels detected during the [EPA] site investigation should not be considered indicative of stable long-term groundwater quality conditions at the site. [Data show] that significant increases in groundwater contaminant concentrations have occurred as a result of a past spill at the Nu-West facility. Although survey results are inconclusive, the data suggest that some leakage from the cooling pond may be occurring presently. If leakage from the cooling pond increases as a result of pond aging or increased water circulation, a contaminant plume may develop and migrate to the south-southwest."[17]

Florida

Gardinier, Inc., in East Tampa, Florida

Gardinier, Inc.'s East Tampa Chemical Plant Complex encompasses about 2,600 acres of land and is located in west-central Hillsborough County, Florida. The facility is located at the mouth of the Alafia River adjacent to Hillsborough Bay. The plant began its operations in 1924 and has been expanded several times by various owners. In 1973, Gardinier, Inc. took over the entire operation. Gardinier, Inc. is owned by Cargill, Inc. of Minneapolis, Minnesota. Operations currently include production of phosphoric acid and phosphate and other fertilizers.[18,19]

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[15] Ibid.

[16] EPA Region 10. 1988. Site Inspection Report to Nu-West Industries Conda Plant, Caribou, Idaho. TDD F10-8702-08. March, 1988.

[17] Ibid.

[18] Ardaman & Associates, Inc. September 23, 1983. Groundwater Monitoring Plan for East Tampa Chemical Plant Complex, Hillsborough County, Florida.

[19] Ibid.

Gardinier's on-site waste management units include two process water ponds (Nos. 1 and 2) and a gypsum stack. Process Water Pond No. 1 is an unlined pond that occupies 13 hectares (32 acres) and is 2 meters (6 feet deep); Process Pond No. 2 occupies 80 hectares and is 2.1 meters deep. The gypsum stack, which as of December 31, 1988 contained about 58 cubic meters (76 million cubic yards) of material, occupies an area of 150 hectares and is 61 meters high. The ponds on top of the gypsum stack occupy 16 hectares and are 2 meters deep. The typical pH of the liquid in the gypsum stack ponds is 1.8.[20]

Phosphogypsum is piped to the gypsum stack as a slurry mixture (approximately 30 percent solids). The gypsum settles from the slurry and the liquid is decanted for reuse in the manufacturing process. Water which seeps through the stack is collected in a perimeter drain that is buried at the toe of the stack. The drain carries the seepage water to a sump in the northeast corner of the gypsum stack where it is pumped to an evaporation pond located on part of the gypsum stack. Surface water run-off from the exterior slopes of the stack is discharged into Hillsborough Bay.[21]

Records at the Hillsborough County Environmental Protection Commission (HCEPC) cite environmental incidents at the Gardinier facility as far back as November 21, 1973, when HCEPC investigated a citizen's complaint and discovered 210 dead crabs in traps placed near the facility's northwest outfall. The pH of the outfall water was 2.9.[22,23]

Water quality violations attributable to Gardinier resulted in the following administrative actions: a Consent Order negotiated between the HCEPC and Gardinier on August 22, 1977; a Citation to Cease Violation and Order to Correct from HCPEC on November 8, 1984; a Warning Notice from the State of Florida Department of Environmental Regulation (FDER) on April 9, 1987; a Citation to Cease and Notice to Correct Violation from the HCEPC on May 26, 1988; and, a Warning Notice from FDER on October 18, 1988. These administrative actions were issued to Gardinier following unpermitted discharges from either the gypsum stack or the cooling water ponds.

The November 8, 1984 citation was issued for an untreated effluent discharge which occurred on October 8, 1984. The citation notes that "toe-drain effluent contains several thousand milligrams per liter of fluorides and phosphorus and up to 150 pico-curries per liter of radioactive substances... Also, its pH can be as low as 1.5 standard units."[24] A sample of the discharge on March 30, 1987, which resulted in the April 9, 1987 warning notice, shows that the pH was 1.9, total phosphorus was 6,740 mg/L and dissolved fluorides was 4,375 mg/L.[25] HCEPC analyzed a sample of the discharge which resulted in the October 18, 1988 warning notice and reported the following results: pH, 2.2; total phosphorus, >4,418 mg/L; and fluoride, 1,690 mg/L.[26]

The May 26, 1988 citation from HCEPC states that "available agency records indicate a considerable history of incidents of discharge resulting in exceedances of environmental standards and contamination of the air and waters of Hillsborough County. Enforcement in each case required remedial actions intended to

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[20] Gardinier, Inc. March 29, 1989. National Survey of Solid Wastes from Mineral Processing Facilities.

[21] Ardaman & Associates, Inc. September 23, 1983. Groundwater Monitoring Plan for East Tampa Chemical Plant Complex, Hillsborough County, Florida.

[22] Hillsborough County Environmental Protection Commission. May 6, 1988. Gardinier History.

[23] Hillsborough County Environmental Protection Commission. November 26, 1973. Interoffice Memo from Robert M. Powell to Richard Wilkins.

[24] Hillsborough County Environmental Protection Commission. November 8, 1984. Citation to Cease Violation and Order to Correct issued to Gardinier, Inc.

[25] Hillsborough County Environmental Protection Commission. March 31, 1987. Notice of Alleged Violation issued to Gardinier, Inc.

[26] Florida Department of Environmental Regulation. October 18, 1988. Warning Notice No. WN88-0001IW29SWD issued to Gardinier, Inc.

correct the effects of the discharge where appropriate, as well as design and maintenance measures to prevent reoccurrence of the same or like incident. Despite all efforts, such incidents continue to occur."[27]

HCEPC records also include a Gardinier Air Complaints Summary which lists 78 citizen complaints about the facility from December 6, 1983 to May 10, 1988. The complaints were made about noxious odors, fumes, smoke, dust or mist from the facility. One of the complaints clearly identifies the gypsum stack as the source; the relationship of the other complaints to gypsum and water management systems at the facility cannot be determined from the available documentation. HCEPC responded to most of these complaints with a phone call or site visit. At least three of the site visits resulted in HCEPC issuing a warning notice to the facility.[28]

Since 1985, Gardinier has monitored ambient air quality for radon and fluoride. In 1985, Gardinier reported its average radon-222 flux from the gypsum pile to be 21.6 pCi/square meter-second (the recently promulgated NESHAP specifies a limit of 20 pCi/m^2-sec). Ambient fluoride was 0.43 ppb, with a maximum reading of 1.2 ppb.[29] Nonetheless, Gardinier reported that no National Ambient Air Quality Standards or National Emissions Standards for Hazardous Air Pollutants were exceeded during 1988.[30]

In addition to the impacts to surface water, biota, and air noted above, ground water at the facility has been affected by facility operations. Ground-water quality has been monitored quarterly at the facility for several years. Since January 1, 1984, standards for the following drinking water parameters were exceeded in wells located both up-gradient and down-gradient of the facility's special waste management units: chromium, radium-226 and radium-228, gross alpha, chloride, iron, manganese, pH, and total dissolved solids.[31] Examination of data for the period 1987 through early 1989 indicates that several on-site wells in the shallow aquifer routinely exceeded the gross alpha primary drinking water standard by a factor of between 2 and 4; exceedances in the intermediate aquifer were also common, although less frequent and of lesser magnitude.

Central Phosphates, Plant City, Florida

The Central Phosphates, Inc. (CPI) Plant City Chemical Complex is located approximately 16 km (10 miles) north of Plant City. The facility occupies approximately 616 hectares (1,520 acres) of land.[32] The site is underlain by a surficial aquifer and the Floridan aquifer. The surficial aquifer ranges in depth from .3 to 15 meters (one to 50 feet) and is recharged by local rainfall.[33] In the Floridan aquifer, the uppermost useable aquifer at the site, wells are generally cased to depths greater than 200 feet.[34] The principal uses of the water in the uppermost useable aquifers underlying the site are rural domestic, agricultural, and commercial/ industrial.[35]

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27 Hillsborough County Environmental Protection Commission. May 26, 1988. Case No. 6169 WP. Citation to Cease and Notice to Correct Violation issued to Gardinier, Inc.

28 Hillsborough County Environmental Protection Commission. Undated. Gardinier Air Complaints Summary.

29 Gardinier, Inc. September 25, 1985. First Annual Report submitted to the Hillsborough County Administrator pursuant to Development Order 80-713.

30 Gardinier, Inc. March 29, 1989. "National Survey of Solid Wastes from Mineral Processing Facilities."

31 Ibid.

32 Ardaman & Associates, Inc., April 2, 1987, Geotechnical Evaluation and Design Recommendations for Proposed Gypsum Stack Expansion, Plant City Chemical Complex, Hillsborough County, Florida (part).

33 Central Phosphates, Inc., March 29, 1989, "National Survey on Solid Wastes from Mineral Processing Facilities."

34 Ardaman & Associates, Inc., August 9, 1988, Contamination Assessment Report, Central Phosphates, Inc., Plant City Phosphate Complex, Hillsborough County, Florida.

35 Central Phosphates, Inc., March 29, 1989, "National Survey on Solid Wastes from Mineral Processing Facilities."

The CPI plant began operation in December 1965; principal products include phosphate fertilizer, sulfuric acid, and ammonia.[36] Phosphogypsum generated during the production of phosphoric acid is disposed onsite at the company's 170 hectare (410-acre) phosphogypsum stack. A 50 hectare unlined process water cooling pond completely surrounds the gypsum stack. The depth of the cooling pond is 2.4 meters (8 feet). As of December 31, 1988, the unlined gypsum stack was 111 feet high and contained approximately 70,000,000 tons of material. The top of the gypsum stack presently contains 8 ponding areas occupying a total area of approximately 105 hectares. Two designated areas on top of the stack, located in the middle, are used for disposal of non-hazardous waste materials, such as construction and demolition debris and non-hazardous chemicals.[37]

Activities at the Central Phosphates site have resulted in ground-water contamination in the surficial and upper Floridan aquifers. To date, it has been determined that the surficial aquifer and, to an undetermined extent, the Floridan aquifer have increased levels of fluoride, sodium, gross alpha radiation, heavy metals, sulfate, total dissolved solids, and nutrient compounds in excess of applicable guidance concentrations and/or state and federal drinking water standards. Contaminated ground water, primarily in the surficial aquifer, has migrated off-site under approximately 11 hectares (27.5 acres) of the Cone Ranch property, located south of the CPI facility.[38,39]

Quarterly ground-water sampling began at the Central Phosphates facility in April 1985. Based on the results of sampling from these wells in the second quarter of 1985, a warning notice was issued to the facility by the Florida Department of Environmental Regulation (DER) for violation of the primary drinking water regulations. Maximum contamination levels for sodium and chromium were exceeded in a down-gradient well in the Floridan aquifer and for sodium, chromium, and fluoride in a down-gradient well in the surficial aquifer.[40]

In June 1987 the West Coast Water Supply Authority provided DER with preliminary data from laboratory analysis of ground-water samples collected from the Cone Ranch property which indicated degradation of both the surficial and the upper Floridan aquifers.[41]

The final report on ground-water investigations conducted at Cone Ranch during May and June 1987, prepared by consultants to the West Coast Regional Water Supply Authority, identifies two areas of contamination on the Cone Ranch property. The report concludes that contamination in one area (designated Area A) was caused by a dike failure and resultant spill of process water from the Central Phosphates facility in 1969 and that contamination in another area (Area B) was caused by seepage of contaminated water from the recirculation pond located immediately north of the spill area.[42]

A consent order addressing the ground-water contamination problems at the site was drafted by DER during July of 1987 and signed by DER and Central Phosphates, Inc. on September 29, 1987. The consent order documents violations of primary and secondary drinking water standards for chromium, sodium, fluoride, gross alpha radiation, lead, and cadmium from a down-gradient well in the surficial aquifer. These violations occurred from May 6, 1985 through April 27, 1987; maximum values listed in the consent order for each

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[36] Ardaman & Associates, Inc., September 21, 1987, Quality Assurance Project Plan, Central Phosphates, Inc., Plant City Phosphate Complex (part).

[37] Central Phosphates, Inc., March 29, 1989, "National Survey on Solid Wastes from Mineral Processing Facilities."

[38] West Coast Regional Water Supply Authority. May 11, 1989. Letter from M. G. Korosy, Hydrologic Services Manager, to M. Troyer, ICF, Inc.

[39] Ardaman & Associates, Inc., August 9, 1988, Contamination Assessment Report, Central Phosphates, Inc., Plant City Phosphate Complex, Hillsborough County, Florida.

[40] State of Florida, Department of Environmental Regulation, Warning Notice No. 29-85-07-182, July 17, 1985.

[41] Case Chronology for Central Phosphates, Inc., undated, Florida Department of Environmental Regulation enforcement files.

[42] Leggette, Brashears & Graham, Inc., July 15, 1987, West Coast Regional Water Supply Authority Hydrologic and Water Quality Site Investigation at Cone Ranch, Hillsborough County, Florida.

contaminant are as follows: chromium, 0.075 mg/L; sodium, 1700 mg/L; fluoride, 6 mg/L; gross alpha, 29 pCi/L; lead, 0.11 mg/L; and, cadmium, 0.022 mg/L. The consent order required Central Phosphates, Inc. to implement corrective measures and ground-water remediation at the site.[43]

The Joint Water Quality/RCRA Overview Committee of the Florida Phosphate Council has recorded quarterly sampling data from the Central Phosphates, Inc. site from April 24, 1985 through January 18, 1989 for DER Well Nos. 1 through 6, as well as data from sampling in April 1988 for miscellaneous other wells located both on and off CPI property. These data show consistent exceedances of water quality standards in the down-gradient surficial aquifer for pH, iron, fluoride, manganese, total dissolved solids, and sulfate. Water quality standards for iron and total dissolved solids were consistently exceeded in the down-gradient upper Floridan aquifer.[44]

The Contamination Assessment Report (CAR) for the CPI facility, prepared pursuant to the Consent Order, concurs with the assessment made by the West Coast Regional Water Quality Authority in its definition of two plumes of contaminated ground water which have migrated offsite. Area A was found to comprise an area of 6.3 hectares (15.5 acres) in the surficial aquifer and 2.4 hectares in the upper Floridan aquifer. The off-site areal plume within the surficial aquifer was found to extend approximately 150 meters (500 feet) south and 460 meters east of the CPI property. The plume in the surficial aquifer of Area B was found to extend approximately 150 meters south in the Cone Ranch property, covering an area approximately 5 hectares.[45] Phase II of CPI's contamination assessment, due for completion in the near future, is to include definition of the lateral and vertical extent of contamination.[46]

Seminole Fertilizer, in Bartow, Florida

The Seminole Fertilizer Corporation (formerly W.R. Grace & Company) Bartow Chemical Plant is located in central Polk County between the towns of Bartow and Mulberry. The plant began operation in 1954, and includes production facilities for phosphoric acid and phosphate and other fertilizers. The facility is underlain with three aquifers. The depth of the surficial aquifer ranges from 3 to 18 meters (10 to 60 ft). The intermediate aquifer ranges in depth from 18 to 61 meters. The typical depth at the facility to the uppermost useable aquifer (the Floridan) is approximately 61 meters.[47]

Waste management facilities at Seminole include one wastewater treatment plant, nine surface impoundments, two landfills, and two phosphogypsum stacks. The wastewater treatment plant, which is a two-stage liming facility, is used only during unusually intense rainfall events. Two surface impoundments are associated with the wastewater treatment plant: surface impoundment No. 1 is the primary liming pond and surface impoundment No. 2 is the secondary pond. Surface impoundment No. 3 occupies approximately 1.3 million square feet and is used as a cooling pond for process wastewaters, while surface impoundments Nos. 4-6 are a series of interconnected cooling ponds. The pH of the process water in the cooling ponds varies from 1.8 to 2.3, due to seasonal rains. Surface impoundments Nos. 7-9 are old clay settling ponds. Of the facility's two landfills, only one is currently in use. Landfill No. 1, occupying approximately 11 hectares (28 acres), is closed. Landfill No. 2 occupies 5 hectares and is used for filter cloths and solid materials not pumped to the gypsum stack.[48]

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[43] Consent Order, September 29, 1987, between the State of Florida Department of Environmental Regulation and Central Phosphates, Inc.

[44] Florida Phosphate Council, Joint Water Quality/RCRA Overview Committee, 1989, Groundwater Sampling Data.

[45] Ardaman & Associates, Inc., August 9, 1988, Contamination Assessment Report, Central Phosphates, Inc., Plant City Phosphate Complex, Hillsborough County, Florida.

[46] West Coast Regional Water, Supply Authority. 1990. Letter from M. Korosy to P. Bill, ICF, Re: Cone Beach Property, Hillsborough County, Florida; Draft Mineral Processing Waste Management Case Study on Central Phosphates, Inc., May 23.

[47] Seminole Fertilizer Corporation. March 27, 1989. "National Survey on Solid Wastes from Mineral Processing Facilities."

[48] Ibid.

The north gypsum stack, which first received waste in 1954, occupies approximately 65 hectares (159 acres) at an average height of 9 meters (28 ft). This stack receives process wastewater, phosphogypsum, gypsum solids from "tank clean out," and filter cloths. As of December 31, 1988, the north gypsum stack contained 14 million short tons of material. The south gypsum stack, which first received waste in 1965, occupies approximately 164 hectares at an average height of 14 meters. As of December 31, 1988, the south gypsum stack had accumulated 38 million metric tons of material.[49]

Activities at the Seminole Fertilizer Corporation facility have resulted in elevated levels of several parameters in ground water in the surficial and intermediate aquifers. This contamination has affected potable water wells in the area, some of which have been replaced with water from the City of Bartow's public supply.[50]

Seminole maintains eight monitoring wells as part of the ground-water monitoring system required for its state permit. Seminole has stated that MW-3 and MW-7 are up-gradient, background wells. All other wells are listed as down-gradient. The facility's ground-water data from September 1986 through March 1989 show that the down-gradient wells repeatedly exceeded the water quality standards for pH, gross alpha radiation, radium-226 and radium-228, iron, manganese, TDS, sulfate, cadmium, chromium, lead, and fluoride.[51]

On March 8, 1988, the Florida DER issued a warning notice to W.R. Grace & Company for violations of its ground-water monitoring permit during the third and fourth quarters of 1987. The standards for gross alpha radiation, radium-226 and radium-228, and sodium had been exceeded in some ground-water samples.[52] The analytical results showed the following maximum concentrations for each parameter: gross alpha, 107 pCi/L; radium-226 & -228, 14.4 pCi/L; and, sodium, 657 mg/L.

In addition to on-site wells, neighboring potable water wells have also been adversely affected. Analytical data from May 1988 show that 12 of 18 wells contained at least one contaminant at levels above the drinking water standards. Contaminants that were found in the samples included arsenic, lead, sodium, gross alpha, radium-226 and radium-228, iron, pH, sulfate, and total dissolved solids.[53] Potable water wells near the facility were replaced by a public water supply from the City of Bartow; W.R. Grace apparently paid for the water supply line installation and connection to the affected water users.[54]

Seminole has also received a warning notice from the Florida DER for an unpermitted discharge of process water from the facility to Bear Branch.[55]

Florida - Other

Management histories similar to those described for the above Florida facilities have also been documented by the Florida DER for CF Chemicals, Inc. and Farmland Industries, Inc. in Bartow, FL, and for Conserv, Inc. in Nichols, FL.

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49 Ibid.

50 Florida Department of Environmental Regulation. September 29, 1988. Conversation Record between B. Barker, Drinking Water Section, and K. Johnson, FDER.

51 Seminole Fertilizer Corporation. June 1, 1989. Copy of facility's ground-water monitoring data from 9/86 to 3/89.

52 Florida Department of Environmental Regulation. March 8, 1988. Warning Notice No. 53-88-03-061.

53 W.R. Grace & Company. June 3, 1988. Letter from Glenn Hall, Environmental Engineer, W.R. Grace & Co., to Kirk Johnson, Florida Department of Environmental Regulation and ground-water monitoring data for private potable wells adjacent to the facility.

54 Florida Department of Environmental Regulation. September 29, 1988. Conversation Record between Bob Barker, Drinking Water Section, and Kirk Johnson, FDER.

55 Florida Department of Environmental Regulation. May 30, 1984. Warning Notice No. 53-84-05-327.

North Carolina

Texasgulf Chemicals, in Aurora, North Carolina

Texasgulf's phosphate plant is located six miles north of Aurora, Beaufort County, North Carolina, near the Pamlico River. Since at least 1973, Texasgulf Chemicals Company, an unincorporated division of Texasgulf, Inc., has engaged in the production of calcined and dried phosphate rock, sulfuric acid, phosphoric and superphosphoric acid, and other phosphate fertilizer ingredients at the Aurora plant.[56]

Waste management units include clay slurry settling ponds, two unlined cooling water ponds, gypsum stacks, and clay blend piles, which contain a mixture of clay and gypsum.

The process of purifying the ore involves the separation of very fine clay particles from the phosphate rock. The clays leave the separation process as a water based slurry that is referred to as "slimes." They are hydraulically transferred to settling ponds where the clear water fraction is separated and discharged. There are 5 settling ponds with discharges to South, Bond, and Long Creeks via 12 permitted outlets.[57]

Two cooling water ponds are used to recirculate process water through the phosphoric acid and fertilizer manufacturing areas, where it is primarily used in acid dilution, cooling, gypsum slurrying, and operation of emission control devices. Pond No. 1, with a surface area of 49 hectares (120 acres), began operation in November 1966. Pond No. 2, with a surface area of 24 hectares, began operation in late 1973.[58]

There are six gypsum stacks or piles located on the plant site. The stacks, which cover approximately 101 hectares, are surrounded by a ditch that returns excess water from the stacks to Pond No. 1. There are also a number of gypsum-clay blend piles (designated R-1, R-2, R-4, and R-5) on the site which are/were used in land reclamation activities.

The North Carolina Department of Environmental Management has recorded a number of incidents dating back to 1980 at the Texasgulf Chemicals Plant which may have resulted in negative environmental impact.[59] These incidents include violations of Texasgulf's effluent permit and spills from the facility. For example, violations of the effluent permit for daily maximum phosphorus and fluoride were recorded in 1980 on March 12, March 13, December 9, and December 11. Daily maximum permit limits are 9 mg/L for phosphorus and 10 mg/L for fluoride. Recorded concentrations for the four days ranged from 11 to 34 mg/L for phosphorus. Fluoride concentrations were 12 mg/L on March 12 and March 13. These violations occurred when contaminated wastewater from the toe ditch of the gypsum pile overflowed into the company's fresh water system. A spill of 150,000 cubic meters (40 million gallons) of gypsum stack decant water into a nearby fresh water canal occurred on January 4, 1987 when a retaining dike around one of the gypsum stacks failed. A 24-hour analysis of the canal water showed a pH drop to a low of 4.2, with a two-hour period when pH was below 6.0. At least 18 dead fish were counted along the canal.[60] The company was fined $1,000 for the incident by the State of North Carolina.[61]

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[56] NC-Environmental Management Commission (EMC). April 2, 1987. Findings and Decision and Civil Penalty Assessment.

[57] NC-Division of Environmental Monitoring (DEM). July 31, 1986. Memorandum from J. Mulligan to R.P. Wilms, Director, NC-DEM, Re: Texasgulf Chemicals Co., Beaufort County.

[58] Texasgulf. July 21, 1988. Preliminary Contamination Assessment at Cooling Ponds No. 1 and 2, Texasgulf Inc. Phosphate Operations, Aurora, North Carolina.

[59] NC-DEM. February 25, 1986. Memorandum from R.K. Thorpe to J. Mulligan, Washington Regional Office, NC-DEM, Re: Texasgulf Chemicals Company, Beaufort County.

[60] NC-DEM. February 10, 1987. Memorandum from R.K. Thorpe to L.P.Benton, Jr., Deputy Director, NC-DEM, Re: Fish Kill, Texasgulf Chemicals Co.

[61] NC-Environmental Management Commission (EMC). April 2, 1987. Findings and Decision and Civil Penalty Assessment.

Recent investigations have focused on leakage from cooling ponds Nos. 1 and 2, which have resulted in ground-water contamination of the first two water-bearing zones at the site.[62] In 1988, Texasgulf commissioned a Preliminary Contaminant Assessment for Cooling Ponds 1 and 2 in fulfillment of requirements for the renewal of a zero discharge permit. As part of this study, Texasgulf installed a total of 21 monitoring wells at the site in March and April of 1988. These monitoring wells included 10 wells at Cooling Pond No. 1, nine wells at Cooling Pond No. 2, and two background monitoring wells.[63]

Initial ground-water samples, obtained from monitoring wells at each of the cooling ponds during April 1988, show the results for the surficial aquifer and the Croatan Aquifer, which underlies the surficial aquifer at the site.[64] These results are displayed in Exhibit 12-6.

The first zone appears to be discharging to the facility's main effluent canal, while the direction of ground-water flow in the next zone is toward the northeast and Pamlico Sound.[65,66] Texasgulf subsequently began additional investigations to delineate the extent of contamination.[67] Initial results appear to support the initial conclusion that contamination is confined to the upper two water-bearing zones and that the Yorktown formation has prevented downward migration of contamination.[68] Texasgulf's Remedial Action Plan is currently under review by the NC-DEM.[69]

Louisiana

Agrico Chemical Co., Donaldsonville, Louisiana

AGRICO Chemical Company's Faustina Works phosphoric acid plant, which is located in Donaldsonville, Louisiana, began operations in 1974. Approximately 68 residents inhabit land within one mile of the facility. Receiving waters are the Mississippi River and the St. James Bayou.

Gypsum waste is slurried with process wastewater to a stacking area, where the solids settle out, and the water drains into adjacent ponds or clearwells.

This facility has experienced problems with elevated concentrations of phosphorus, fluoride and acid pH levels in surface and ground waters. Emergency discharges of untreated waters to surface water have occurred periodically throughout much of the 1980s; contamination of the ground water was reported in 1986.

EPA Region VI has prohibited the discharge of gypsum into the Mississippi River. About 1983, Agrico requested a modification of its NPDES Permit from EPA to allow Agrico to discharge gypsum to the Mississippi River under certain conditions. Agrico argued that the 1973 impoundment design was based on Florida facilities, and that the Louisiana climate and soils are different. Agrico stated that the height

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[62] Texasgulf. July 21, 1988. Preliminary Contamination Assessment at Cooling Ponds No. 1 and 2, Texasgulf Inc. Phosphate Operations, Aurora, North Carolina.

[63] Ibid.

[64] Texasgulf. July 21, 1988. Preliminary Contamination Assessment at Cooling Ponds No. 1 and 2, Texasgulf Inc. Phosphate Operations, Aurora, North Carolina.

[65] NC-DEM. December 13, 1988. Memorandum from B. Reid to A. Mouberry, Re: Texasgulf, Inc. Renewal of Permit No. 2982, Cooling Ponds Nos. 1 and 2.

[66] NC-DEM. January 17, 1989. Memorandum from R. Jones to C. McCaskill, Sup. State Engineering Review Unit, Permits and Engineering Branch, Re: Permit Renewal No. 2982 Cooling Ponds #1 and #2 Texasgulf, Inc.

[67] NC-DEM. December 13, 1988. Memorandum from B. Reid to A. Mouberry, Re: Texasgulf, Inc. Renewal of Permit No. 2982, Cooling Ponds Nos. 1 and 2.

[68] NC-DEM. June 3, 1989. Memorandum from B. Reid to R. Smithwick, Re: Texasgulf, Inc. Remedial Action Plan Cooling Ponds No. 1 and No. 2.

[69] Ardaman & Associates. February 6, 1990. Letter from T.S. Ingra and J.E. Garlanger to W.A. Schimming, Texasgulf, Re: Response to Deficiencies Noted by DEM Concerning the Cooling Pond No. 1 and No. 2 Remedial Action Plan and Proposed Revised Remedial Action Plan, Texasgulf Phosphate Operations.

Exhibit 12-6a
Ground-water Quality at Cooling Ponds 1 and 2 in the Surficial Aquifer Confined Sand Layer

Parameter	State Drinking Water Standard (mg/L)	Cooling Pond 1 (mg/L)	Cooling Pond 2 (mg/L)
Phosphorus (Total)	-	42.5 - 6,475	0.04 - 660
Fluoride	1.5	1.5 - 2,790	0.2 - 6.5
Chloride	250	151 - 189	20 -228
Sulfate	-	3,648 - 4,337	ND - 3,586
Total Dissolved Solids	500	5,685 - 27,783	255 - 4,444

Exhibit 12-6b
Ground-water Quality at Cooling Ponds 1 and 2 in the Croatan Aquifer Confined Shell Layer

Parameter	State Drinking Water Standard (mg/L)	Cooling Pond 1 (mg/L)	Cooling Pond 2 (mg/L)
Phosphorus (Total)	-	0.3 - 125	0.05 - 32
Fluoride	1.5	0.2 - 2.5	0.1 - 0.5
Chloride	250	32 - 184	11 - 71
Sulfate	-	374 - 2,447	2.9 - 436
Total Dissolved Solids	500	915 - 6,722	219 - 1,451

limitation meant that the original 240 hectares (600 acres), which would have lasted until about 1998 would now last only until 1989.[70]

In addition, Agrico stated further that "[a]nother related consequence is that the amount of contaminated run-off produced will increase geometrically as the impoundment acreage expands....Of the alternatives considered, only the 'River Disposal/Partial Impoundment' option represents a reasonable and environmentally feasible alternative." Agrico concluded that "the water imbalance problem caused by continued total impoundment would result in an increased potential for the release of contaminated water."[71]

On April 15, 1983, a portion of Agrico's 62-foot gypsum stack failed structurally and released 230,000 cubic meters (60 million gallons) of water from its 40 hectare (100-acre) pond onto plant property.[72,73,74] The

[70] U.S. Environmental Protection Agency, Region 6. Undated. Report submitted by attorneys for Agrico Chemical Company, Kean, Miller, Hawthorne, D'Armond, McCowan & Jarman, and Hall, Estill, Hardwick, Gable, Collingsworth & Nelson, Re: Agrico Chemical Company, NPDES Permit LA0029769.

[71] Ibid.

[72] Agrico. 1983. Letter from R.A. Woolsey, Plant Manager to J. Dale Givens, Administrator DNR, Re: WPCD Inspection of the Faustina Facility on April 22, 1983.

[73] Louisiana DNR. May 11, 1983. Installation Inspection Forms, completed by Susan Stewart, Installation Representative.

spilled water was pumped to another gypsum holding stack; concern over the potential failure of this stack, however, led Agrico to discharge the untreated water to the Mississippi River over a period of several weeks. These discharges exceeded permit limits.[75,76] After the pond failure, water of pH 2 was found flowing in an on-site drainage ditch at approximately 20 gpm into the St. James Bayou. The large volume of released water had destroyed a dam that controlled flow from the drainage ditch into the St. James Canal. Agrico reinstalled the dam on April 22, 1983, and transferred the low pH water still in the dammed section of the ditch back to the gypsum pond system. Agrico checked the water in St. James Canal, concluding that it did not seem affected by the low pH water discharged to it as a consequence of the April 15, 1983 gypsum pond failure.[77,78]

Due to heavy rainfall, Agrico has continued to periodically perform emergency discharges of untreated stormwater from the clearwell, as occurred in March and again in June 1987. In its letter of notification, Agrico stated that "additional rain could result in catastrophic levee failure leading to loss of life, personal injury, or severe property damage."[79]

In March 1986, Agrico reported to LA DEQ that the water along the length of the north and east phosphogypsum perimeter ditches might be "slightly impacted" by phosphate, sulfate, and fluoride.[80]

In August 1986, Agrico submitted to LA DEQ a Hydrologic Assessment report for the Donaldsonville facility. LA DEQ regarded the reported situation as requiring corrective action: "Contamination of the shallow ground water, although by constituents which are not of great concern, poses a threat to drinking water. The Department's position is that the same physical characteristics that allow the contaminants to travel through the shallow silt faster than your theoretical model are present in the underlying clays."[81]

Even under non-emergency circumstances, Agrico has had difficulty keeping in compliance with NPDES permit limitations. In April 1987, an investigator reported that discharges from Agrico's inactive gypsum impoundment (Outfall 002) were in exceedance (up to 35 times) of permitted levels. However, the investigator determined that no action would be taken "until reissuance of new permit."[82]

In August 1987, LA DEQ determined that Agrico could not comply with the Louisiana Water Discharge Permit System that had been effective since March 1987.[83] LA DEQ issued an Administrative Order to Agrico to allow the facility to temporarily discharge water from gypsum stacks until standards were met.[84,85,86,87]

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[74](...continued)

[74] U.S. Environmental Protection Agency, Region 6. Undated. Report submitted by attorneys for Agrico Chemical Company, Kean, Miller, Hawthorne, D'Armond, McCowan & Jarman, and Hall, Estill, Hardwick, Gable, Collingworth & Nelson, Re: Agrico Chemical Company, NPDES Permit LA0029769.

[75] Ibid.

[76] Louisiana DEQ. October 25, 1984. Memorandum from Patricia L. Norton, Secretary, to J. Dale Givens, Assistant Secretary, Re: Agrico Chemical Co.

[77] Agrico. April 29, 1983. Letter from R.A. Woolsey, Plant Manager to J. Dale Givens, Administrator DNR, Re: WPCD Inspection of the Faustina Facility on April 22, 1983.

[78] Louisiana DNR. May 11, 1983. Installation Inspection Forms, completed by Susan Stewart, Installation Representative.

[79] Agrico. June 17, 1987. Letter from R.A. Woolsey, Plant Manager to Myron O. Knudson, U.S. EPA Region 6 Director Water Management, Re: NPDES Permit Number: LA0029769. With attachment.

[80] Agrico. March 12, 1986. Letter from Susan P. Stewart, Manager, Energy and Environmental Control to Gerald Healy, Administrator, LA DEQ Solid Waste Division, Re: Agrico Phosphogypsum Site (P-0063) GD-093-0791.

[81] Louisiana DEQ. August 22, 1986. Letter from George H. Cramer, II, Administrator to Susan Stewart, Agrico Manager Energy and Environmental Control, Re: Hydrogeologic Assessment, Final Report GD-093-0791.

[82] U.S. Environmental Protection Agency, Region 6. 1986-88. NPDES Violation Summaries, from 10/18/86 - 4/12/88.

[83] Louisiana DEQ. August 17, 1987. Inter-office Letter, from G.S. Chambers to D.J. Miller, Re: Faustina Plant - Administrative Order.

[84] Ibid.

According to the LA DEQ, this facility has not experienced non-compliance or emergency release problems since those outlined in this section.

Arcadian, Geismar, Louisiana

This facility, formerly owned by Allied Chemical, has been operational since 1967. The plant is situated along the Mississippi River, in Geismar, Louisiana, northeast of the intersection of LA Highways 75 and 3115. Approximately 150 residents live within 1.6 km (1 mile) of the facility.[88] There are private drinking water wells within a 1.6 km radius of the facility.[89,90] The water table occurs at 24 meters (80 feet) below the land surface in the wet season, and 30 meters in the dry season.[91] The Mississippi River receives the discharges from this facility.

The phosphogypsum waste is slurried to the stack with process wastewater, which drains into a retention pond referred to as "the clearwell." There are four clearwells of differing sizes at the site, one of which is described as active. Six phosphogypsum stacks occupy the site as well, one or two of which appear to be active.

The effluent guidelines prohibiting discharge of process pollutants from a wet phosphoric acid facility were rescinded for the plants on the lower Mississippi due to poor soil stability and excess precipitation. EPA Region 6 described the condition as follows: "The withdrawal of the guidelines allowed the creation of the concept of active and inactive impoundments. The inactive impoundment drainage may be discharged directly to the receiving stream without limits provided no further wastes are sent to the inactive system and the discharge meets water quality standards."[92]

Two major categories of contaminant release to the environment have occurred at this facility: radioactivity releases to the ground water and clearwell discharges causing excessive phosphorus and fluoride loadings, as well as elevated pH, to surface waters. A third area of concern is fluoride fugitive emissions from the clearwell.

Arcadian has installed numerous monitoring wells throughout the gypsum stack and clearwell areas. Arcadian's ground-water monitoring report for the second half of 1988 showed gross alpha radiation in well P4 at 95 ± 31 pCi/L and 60 ±14 pCi/L in well P10.[93] The MCL for gross alpha radiation is 15 pCi/L. These releases are not extensively documented in the files reviewed; the documents reviewed did not discuss actions taken in response to the results presented.

The net surplus of precipitation in this region has prompted Arcadian to perform emergency discharges of excess water from its clearwell. Arcadian has justified this action by stating that until the NPDES permit effluent limitations are modified, there are no other environmentally acceptable alternatives

[85](...continued)

[85] Louisiana DEQ Water Pollution Control Division. 1987-88. Administrative Order issued by DEQ.

[86] U.S. Environmental Protection Agency. September 8, 1987. NPDES Compliance Inspection Report.

[87] U.S. Environmental Protection Agency, Region 6. 1988. Administrative Order, Re: Agrico Chemical Company, Docket No. VI-87-1411.

[88] Arcadian. April 21, 1989. "National Survey on Solid Wastes from Mineral Processing Facilities."

[89] Ibid.

[90] Gentry, J. January 20, 1989. Handwritten letter to LADEQ, Re: Questions and Comments on Permit Application.

[91] Arcadian. April 21, 1989. "National Survey on Solid Wastes from Mineral Processing Facilities."

[92] U.S. Environmental Protection Agency, Region 6. May 11, 1989. Letter from K.G. Huffman to M. Harbourt, of Kean et al, Attorneys at Law, Re: Arcadian Corporation, NPDES Permit No. LA0066257.

[93] Arcadian. January 15, 1989. Letter from J.J. Baker to T. Hardy, OSHW LADEQ, Re: ID #GD-005-1822 Ground Water Monitoring Report.

to the emergency bypass of the clearwell water.[94] The accumulation of facts throughout the documents suggests that excess water can cause failure of the gypsum stack or of the clearwell walls. During a discharge on February 27, 1987, Arcadian stated that the action was necessary "to prevent possible injury and severe property damage."[95] Such a discharge occurred again beginning on March 10 of the same year.[96] During these discharges, pH values ranged from 1.3 to 2.5; phosphorus concentrations from 3,688 mg/L to 7,960 mg/L; and fluorine concentrations from 6,188 to 14,649 mg/L.

An EPA NPDES Violation Summary, based on discharge monitoring reports from March 1986 to December 1987, showed that Outfall 003 violated effluent limits each month from at least December 1985 until August 1987. No enforcement action was taken for any of these violations. Since February of 1987, the EPA inspector has noted: "No action taken - waiting for an enforceable permit." Contaminant concentrations were similar to those listed above.

On December 8, 1988, EPA Region VI issued an Administrative Order to Arcadian regarding several violations, including the discharge on October 28 of that year of calcium sulfate run-off (Outfall 003) containing total phosphorus of 8,176 lbs/day, exceeding the permitted limit of 7,685 lbs/day.[97]

According to the LA DEQ, this facility has not experienced non-compliance or emergency bypass problems since those outlined in this section.

Louisiana -- Other

The management histories described for the above Louisiana facilities are also typical of the other Agrico facilities (Hahnville and Uncle Sam).

12.3.3 Findings Concerning the Hazards of Phosphogypsum and Process Wastewater

Based upon the detailed examination of the inherent characteristics of phosphogypsum and process wastewater arising from the production of wet process phosphoric acid, the management practices that are applied to these wastes, the environmental settings in which the generators of the materials are situated, and the numerous instances of documented environmental damage that have been described above, EPA concludes that current practices are inadequate to protect human health and the environment from the potential danger posed by these wastes.

Intrinsic Hazard of the Wastes

Review of the available data on phosphogypsum and its leachate constituent concentrations indicates that concentrations of 12 constituents exceed one or more of the screening criteria by more than a factor of 10, and that maximum chromium and phosphorus concentrations exceed the screening criteria by factors of greater than 1,000. In addition, two samples of phosphogypsum (out of 28) contained chromium concentrations in excess of the EP toxicity regulatory level, and phosphogypsum frequently contains uranium-238 and its decay products at levels that could present a high radiation hazard if the waste is allowed to be used in an

[94] Kean, et al, Attorneys at Law. November 6, 1984. Letter from M.N. Harbourt to J.V. Ferguson, EPA Region 6, Re: Notice of Anticipated Bypass, NPDES Permit No. LA0066257, Arcadian Corp., EPA File No. 7945-1.

[95] Arcadian. February 27, 1987. Letter from M.N. Harbourt to J. Van Buskirk, EPA Region 6 and J.D. Givens, LADEQ, Re: Notice of Anticipated Bypass and Request for Order Authorizing Bypass.

[96] Kean, et al, Attorneys at Law. March 19, 1987. Letter from M.N. Harbourt to J. Von Buskirk, EPA Region 6, Re: Arcadian Corporation - NPDES Permit Number: LA-0066257, EPA File Number: 7945-1.

[97] U.S. Environmental Protection Agency, Region 6. December 8, 1988. Cover letter from M.O. Knudson to H.J. Baker, Arcadian, Re: Administrative Order Docket No. VI-89-043, NPDES Permit No. LA0066257. 12/8/88. (Administrative Order attached).

unrestricted manner. This finding leads EPA to conclude that the intrinsic hazard of this waste is moderate to high.

Review of the available data on phosphoric acid process wastewater constituent concentrations indicates that phosphorus and phosphate are present at concentrations that sometimes are more than 100,000 times the screening criteria, arsenic and phenol are present at concentrations more than 1,000 times the screening criteria, and 15 additional constituents exceed a screening criteria by a factor of at least 10. In addition, process wastewater exhibits the RCRA hazardous waste characteristics of corrosivity (i.e., pH < 2) and exhibits the characteristic of EP toxicity (based on cadmium, chromium, and selenium concentrations). The wastewater also contains radium-226, gross alpha radiation, and gross beta radiation levels that could pose an unacceptably high radiation hazard if the wastewater is mismanaged. Based on these findings, EPA concludes that the intrinsic hazard of phosphoric acid process wastewater is high.

Potential and Documented Danger

The documented cases of dangers to human health and the environment indicate that phosphogypsum and process wastewater constituents have been released to ground water at a number of facilities and, at some sites, have migrated off-site to potable drinking water wells in concentrations that are well above hazard criteria. Based on the analysis of the damage case evidence, EPA concludes that management of phosphogypsum and process wastewater in stacks and ponds can release contaminants to the subsurface. Given the hydrogeologic setting and ground-water use patterns in the vicinity of most phosphoric acid plants, released contaminants threaten human health via potential drinking water exposures and render ground-water resources unsuitable for potential use.

Based on the analysis of the damage case evidence, it is clear that management of phosphogypsum and process wastewater in stacks and ponds can and does release contaminants to nearby surface waters. Given this evidence of releases, the proximity of most phosphoric acid plants to surface water bodies, and surface water use patterns, EPA concludes that at many phosphoric acid plants these released contaminants migrate to rivers and bays and threaten human health via drinking water exposures, threaten aquatic life, or render surface water resources unsuitable for potential consumptive uses.

EPA risk estimates demonstrate that phosphogypsum stacks pose a considerable air pathway cancer risk as a result of radon emissions from the stacks, with minor contributions from radioactive and nonradioactive constituents in windblown phosphogypsum. EPA estimates a maximum total air pathway lifetime cancer risk for a maximally exposed individual of approximately $9x10^{-5}$. This risk is primarily from inhalation of radon emitted from stacks ($9x10^{-5}$), with minor contributions from the inhalation of windblown phosphogypsum particles containing radionuclides ($2x10^{-6}$) and arsenic and chromium ($7x10^{-7}$).

12.4 Existing Federal and State Waste Management Controls

12.4.1 Federal Regulation

Section 3001(b)(3)(B)(iii) of RCRA provides the EPA Administrator with explicit authority to regulate the use of the use of solid wastes from phosphate rock processing for construction or land reclamation so as to prevent radiation exposure which presents an unreasonable risk to human health. EPA has not availed itself of this authority to date, but plans to consider regulatory options under this provision of RCRA to limit the off-site use in construction of elemental phosphorus slag, another special waste from mineral processing (see Chapter 7).

Off-site use of phosphogypsum has already been prohibited by the final National Emission Standards for Hazardous Air Pollutants (NESHAP) for radionuclides that was promulgated on December 15, 1989 (54 FR 51654). This rule requires that as of the effective date of the rule (March 15, 1990), phosphogypsum be disposed in stacks or in mined-out areas, effectively prohibiting use as a construction material or agricultural soil supplement.[98]

Under the Clean Water Act, EPA has the responsibility for setting "effluent limitations," based on the performance capability of treatment technologies. These "technology based limitations," which provide the basis for the minimum requirements of NPDES permits, must be established for various classes of industrial discharges, including a number of mineral processing categories.

Permits for mineral processing facilities may require compliance with effluent guidelines based on best practicable control technology currently available (BPT) or best available technology economically achievable (BAT). BPT effluent limitations of process wastewater from wet-process phosphoric acid, normal superphosphoric acid, and triple superphosphoric acid include (40 CFR 418.12(c)):

Pollutant	Daily Maximum	Monthly Average
Total Phosphorus	105 mg/L	35 mg/L
Fluoride	75 mg/L	25 mg/L
Total Suspended Solids	150 mg/L	50 mg/L

Effluent limitations concerning the concentrations of pollutants contained in (1) the discharge of contaminated non-process wastewater after application of BPT and BAT (40 CFR 418.12(d) and 418.13(d)), (2) discharges of process wastewater related to phosphoric acid production from existing sources after application of BAT (40 CFR 418.13(c)), and (3) process wastewater from defluorination of phosphoric acid after application of BPT and BAT are identical and as follows (40 CFR 422.52(c) and 422.53(c):[99]

Pollutant	Daily Maximum	Monthly Average
Total Phosphorus	105 mg/L	35 mg/L
Fluoride	75 mg/L	25 mg/L

No discharges of process wastewaters from the production of phosphoric acid or from the defluorination of phosphoric acid are allowed from new sources.

In cases where the State does not have an approved NPDES program, such as Texas, Louisiana, and Florida, EPA Regional personnel have stated that EPA applies the above guidelines. However, EPA may also adopt State water quality standards for the management of these discharges, if applicable. In Idaho, which also does not have an approved NPDES program, the Federal guidelines listed above would apply. EPA Regional staff have not been available to confirm current policy regarding discharges from phosphoric acid facilities. The State of Florida does not currently have an EPA-approved NPDES program. Therefore, existing Federal regulations concerning the management of wastes from the production of phosphoric acid, would apply for facilities in this State. Wastes from phosphoric acid production are subject to the effluent limitation guidelines set forth in 40 CFR Part 418 Subpart A.

The Chevron Chemical Company phosphoric acid facility located in Rock Springs, Wyoming is situated on federal lands managed by the Bureau of Land Management (BLM). The Federal Land Policy and Management Act of 1976 (FLPMA, 43 USC 1732, 1733, and 1782) authorizes BLM to regulate mining

[98]On April 10, 1990 EPA published a Notice of Limited Reconsideration that provided a limited class waiver that allows continued use of phosphogypsum for agricultural uses for the duration of the current growing season, but not to extend beyond October 1, 1990. This notice also solicited comment on alternative uses of phosphogypsum, i.e., management practices other than disposal.

[99] The limitations for defluorination process wastewater also include daily maximum limits of 150 mg/L and 6-9 and monthly average limits of 50 mg/L and 6-9 for TSS and pH respectively.

activities on its lands with respect to the environmental effects of such activities. BLM regulations implementing this law (43 CFR 3809) are intended to prevent unnecessary or undue degradation of its lands, or lands that are under consideration for inclusion in the national wilderness system. These regulations provide for reclamation of lands disturbed by mining, hence, are not directly applicable to mineral processing activities.

12.4.2 State Regulation

The 21 facilities in the phosphoric acid sector are located in seven states, including Florida, Louisiana, Idaho, Mississippi, North Carolina, Texas, and Wyoming. All of these states except Wyoming were selected for regulatory review (see Chapter 2 for a discussion of the methodology used to select states for regulatory study). The majority of the 21 phosphoric acid facilities are located in Florida, Louisiana, and Idaho, which have twelve, three, and two facilities, respectively. Based on the distribution of facilities, therefore, state-level regulation of phosphoric acid processing wastes is of particular interest in the States of Florida, Louisiana, and Idaho.

As a general overview, six of the seven states with phosphoric acid processing facilities (all but Wyoming), adopt the federal exclusion from hazardous waste regulation for special wastes from mineral processing. Florida regulates wastes from the production of phosphoric acid under its solid waste rules, while Louisiana and Texas classify and manage such wastes as industrial solid waste. Mississippi and North Carolina exempt wastes generated in all types of mineral processing facilities from regulation as solid wastes. No requirements in Idaho's solid waste regulations apply to these wastes. Finally, three of seven states (North Carolina, Mississippi, and Wyoming) have EPA-approved NPDES programs while all seven states have air quality control regulations or standards that may be applicable to wastes from mineral processing facilities.

As noted above, most of the phosphoric acid processing facilities under study are located in Florida. Also as noted, Florida adopts the federal exclusion from hazardous waste regulation for mineral processing wastes. The state addresses phosphoric acid processing wastes under its solid waste regulations, though these regulations do not contain requirements pertaining specifically to phosphogypsum stacks or process wastewater cooling ponds. The state issues two types of permits for solid waste disposal activities at phosphoric acid facilities, including an industrial wastewater discharge permit (required for cooling ponds and maintained for some old stacks), and a solid waste disposal permit required of new stacks. Recent monitoring efforts have prompted the state to establish additional controls over stacks. Florida now requires that all discharges to ground water, in addition to established zones of discharge, be addressed by an appropriate permit. The state also applies modified landfill requirements, interim requirements, and limited wastewater facilities regulations, and is in the process of modifying the solid waste regulations with regard to design and operating standards, closure requirements, and financial responsibility requirements applicable to phosphogypsum stacks and cooling ponds.

Current regulation of phosphoric acid processing wastes in Florida, therefore, consists primarily of the requirement to obtain a permit for discharges to ground water and the requirement that new stacks and expansions of existing stacks be clay-lined and undergo formal closure. Under this policy, closure requirements include cover adequate to prevent infiltration and run-off controls. Further, all cooling ponds in the state must have run-on/run-off controls. The state also may place waste disposal location restrictions, performance standards, and operating requirements on a facility's solid waste disposal permit. The Florida Department of Environmental Regulation has the authority to conduct on-site inspections, issue administrative and consent orders, and require remedial action, though it does not have the authority to fine facilities for non-compliance. Finally, although air emissions from the phosphate industry are regulated under the state's air pollution rules, state officials indicated that phosphogypsum stacks typically crust over or are managed as part of a wet system so that fugitive dust emissions traditionally have not been considered a problem.

Louisiana, with three phosphoric acid processing facilities, also excludes mineral processing wastes from regulation as hazardous waste. Louisiana classifies and regulates mineral processing wastes as industrial solid wastes. Although no requirements have been drafted specifically for phosphogypsum stacks, facility

12.5 Waste Management Alternatives and Potential Utilization

12.5.1 Waste Management Alternatives

Waste management alternatives, as discussed below, include alternative processes for manufacturing phosphoric acid and methods of purifying (i.e., reducing concentrations of radionuclides and/or other contaminants) the phosphogypsum so that it can be safely used in agriculture or construction. Direct recycling of phosphogypsum is not a viable alternative, because the phosphogypsum itself cannot be used in the production of phosphoric acid, although it is already common practice to recycle the process water used to slurry the phosphogypsum. One exception to this, as is discussed briefly in the section on utilization, is the production of sulfur dioxide (SO_2) by the thermal decomposition of phosphogypsum, which can be recycled to the manufacturing process as sulfuric acid.

Process Alternatives for Manufacturing Phosphoric Acid

There are a number of variations of the basic wet-acid process used to manufacture phosphoric acid. These alternative processes are considered in this section because the phosphogypsum that they generate may differ in its degree of hydration (hemihydrate vs. dihydrate) at the time of generation, which can determine which purification methods can be applied to the phosphogypsum, and how efficiently they can remove the impurities. In addition, the amount of preprocessing required before some types of utilization (e.g., as wall board or plaster) can also vary with the production process used. Unfortunately, there is insufficient data available to attempt an evaluation the volume, composition, or potential hazard(s) of the phosphogypsum generated by the different processes. Consequently, this discussion focuses on the differences that could be relevant to the subsequent treatment, utilization, or disposal of phosphogypsum generated by the different production processes.

Description

The processes to be discussed are the classic Prayon and Nissan-H processes which generate the dihydrate form of phosphogypsum ($CaSO_4 \cdot 2H_2O$); and the Central-Prayon and Nissan-C processes, which generate the hemihydrate form of phosphogypsum ($CaSO_4 \cdot \frac{1}{2}H_2O$).

In the classic Prayon process, the dihydrate phosphogypsum is filtered out of the solution produced by the digestion of phosphate rock by sulfuric acid. The phosphogypsum is then pumped as a slurry to gypsum stacks for disposal.[100,101]

In the Central-Prayon process, the dihydrate phosphogypsum is filtered out of the solution produced by the digestion of phosphate rock by sulfuric acid. The phosphogypsum is converted to the hemihydrate form by heating it and adding sulfuric acid, whereupon the hemihydrate/phosphogypsum is extracted from the acid slurry by counter-current washing, and the liquid is recycled to the phosphate rock digestion process, and the hemihydrate slurry being sent to the stacks for disposal.[102]

In the Nissan-H process, the phosphate rock is digested by sulfuric acid at a high temperature which causes most of the phosphate rock to decompose and the hemihydrate form of phosphogypsum to be generat-

[100] Pena, N., Utilization of the Phosphogypsum Produced in the Fertilizer Industry, UNIDO/IS.533, United Nations Industrial Development Organization (UNIDO), May 1985, p. 30.

[101] Muehlberg, P.E., J.T. Reding, B.P. Shepherd, Terry Parsons and Glynda E. Wilkins, Industrial Process Profiles for Environmental Use: Chapter 22. The Phosphate Rock and Basic Fertilizer Materials Industry, EPA-600/2-77-023v, Environmental Protection Technology Series, prepared for Industrial Environmental Research Laboratory, ORD, U.S. Environmental Protection Agency, February 1977, p. 21.

[102] Ibid., p. 31.

owners/operators must comply with provisions for soils (e.g., stability, permeability), hydrologic characteristics, precipitation run-on and run-off, location standards, security, safety, and waste characterization. New stacks must have liners as well. During closure, the owner/operator must emplace a final cover or some alternate erosion control measure. Similarly, process wastewater cooling ponds must meet industrial waste surface impoundment requirements such as run-on controls, liner requirements, design standards (e.g., to prevent overtopping and minimize erosion), and waste characterization and ground-water monitoring requirements. Surface impoundments must be dewatered and clean-closed (i.e., all residuals removed) or closed according to solid waste landfill closure provisions. Owners/operators of both phosphogypsum stacks and process wastewater ponds must maintain financial responsibility for the closure and post-closure care of those units. In addition to these solid waste regulations, the three facilities in Louisiana must comply with federal NPDES permits and Louisiana Air Emissions Permits. Under the air permits, the facilities must be operated in a manner to minimize fugitive dust and could be required to undertake fugitive dust controls, such as the application of chemicals, asphalt, or water, if deemed necessary by the state. Finally, the state requires that owners/operators obtain a permit in order to construct a new facility or make a major modification to an existing facility.

Like Florida and Louisiana, Idaho, with two phosphoric acid processing facilities, excludes mineral processing wastes from its hazardous waste regulations. Unlike all of the other states with phosphoric acid processing facilities, however, Idaho does not apply any solid waste regulatory requirements to either phosphogypsum stacks or process wastewater cooling ponds. Moreover, the state does not have an approved NPDES program and, although the two facilities located in Idaho are broadly responsible for reasonable control of fugitive dust emissions, the state does not specifically address stacks or ponds in the facilities' air permits.

As noted, Mississippi, North Carolina, and Texas each have a single phosphoric acid facility and exclude those facilities from hazardous waste regulations. The facility located in Mississippi, which is not currently in operation, does have a current Mississippi NPDES permit. Because this facility disposes of its waste on site, however, the state does not require that the owner/operator obtain a solid waste management permit and does not plan to address the phosphoric acid wastes unless a threat to public health and the environment is demonstrated. The facility in North Carolina has a current North Carolina NPDES permit for its wastewaters. In accordance with a state-issued mining permit, the facility currently uses its phosphogypsum as fill for mined-out areas. The state does not regulate the stacks as solid wastes, but rather addresses them with non-discharge permits issued by the Water Quality Section of the Division of Environmental Management. North Carolina has initiated several consent agreements with the facility to address releases to surface and ground waters. The state also recently promulgated new air regulations that address radionuclide contaminants and may result in increased fugitive dust emission controls for phosphogypsum stacks. As with Mississippi, the facility in Texas has not been required to obtain a solid waste permit because it disposes of its wastes on property owned by the facility owner/operator. The facility has notified the state of its waste management activities, however, and has obtained federal NPDES and Texas wastewater discharge permits. Both North Carolina and Texas have addressed air emissions from phosphogypsum stacks only under general emission requirements. The final state with a phosphoric acid processing facility, Wyoming, was not studied in detail for this report. Wyoming appears to regulate its single facility under solid waste regulations and the state's approved NPDES program.

In summary, the two states with the most phosphoric acid processing facilities, Florida and Louisiana, appear to regulate those facilities most comprehensively. Of the remaining states, Mississippi, Texas, and Wyoming have placed fewer regulatory requirements on the phosphoric acid processing wastes managed within their borders, while Idaho has imposed essentially no requirements on the two facilities located within the state. In all cases, the wastes are addressed in general by NPDES, air, and solid waste landfill and surface impoundment requirements only, and not by regulations tailored specifically to phosphogypsum stacks or process wastewater cooling ponds.

ed.[103] The hemihydrate slurry is cooled and recrystallized to dihydrate by using seed crystals of dihydrate phosphogypsum. This recrystallization step results in the formation of phosphogypsum crystals which can be easily filtered, and are believed to be of sufficient quality to be utilized in building materials without additional treatment.[104,105]

The Nissan-C process is very similar to the Nissan-H process, the main difference being that the hemihydrate slurry is recrystallized by both cooling it and changing its acid concentration, which results in phosphoric acid concentrations of 45-50 percent without evaporation (as opposed to the 30-35 percent normally produced by the dihydrate processes) and in a higher quality phosphogypsum.[106]

Current and Potential Use

It is uncertain which of the above processes are used by each of the phosphoric acid facilities, although EPA believes that at least two or three of the facilities use one of the processes (Central-Prayon or Nissan-C) which generate hemihydrate phosphogypsum, and that the rest of the facilities use one of the processes (classic Prayon or Nissan-H) which generate dihydrate phosphogypsum.

There do not appear to be any insurmountable obstacles preventing any of the facilities from using any of the available production processes. Some of the reasons why particular facilities use, or have converted to, a particular process have been that the hemihydrate processes are more energy efficient because the phosphoric acid that they produce is more concentrated (hence, requires less evaporative concentration, which is energy-intensive), and that the dihydrate processes are easier to control and maintain. If it becomes necessary to reduce the radionuclide content in the phosphogypsum (see the discussion of phosphogypsum purification below) so that it could be utilized rather than disposed (see section 12.5.2), facilities might have more incentive to begin using one of the processes which generate hemihydrate phosphogypsum, since the two purification methods which employ acid digestion require anhydrite or hemihydrate phosphogypsum.

Purification of Phosphogypsum

Utilization of phosphogypsum in construction and agriculture is constrained by the presence of impurities and hazardous constituents in the waste. Constituents such as radium-226 and arsenic may need to be removed because of the hazards they may present to human health and the environment, while phosphates and fluorides need to be removed for technical reasons related to the methods of utilization. The impurities include insolubles such as silica sand and unreacted phosphate ore; occluded water soluble phosphoric acid and complex fluoride salts; and interstitially trapped ions within the phosphogypsum crystal lattice, such as HPO_4^{2-}, AlF_5^{2-}, and radioactive radium-226.[107]

Description

Several processes for removing radium-226, as well as the other impurities, have recently been developed.[108,109] These processes involve either acid digestion of the phosphogypsum or simple physical removal of the more radioactive portions of the phosphogypsum.

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[103] Ibid., p. 14.

[104] Ibid., p. 16.

[105] The absence of supporting data has prevented EPA from evaluating the validity of this statement.

[106] Muehlberg, op. cit., p. 18.

[107] Palmer, J.W, and J.C. Gaynor, Phosphogypsum Purification, USG Corporation, Libertyville, Illinois, May 30, 1985, p. 1.

[108] Ibid.

[109] Palmer, J.W., Process for Reducing Radioactive Contamination in Phosphogypsum, U.S. Patent 4,338,292 to USG Corporation, June 14, 1983, p. 2.

The method of physical separation can reduce the radionuclide concentration of the phosphogypsum by approximately 30 percent. The method involves the use of a hydrocyclone to remove the phosphogypsum crystals smaller than 30 microns (which contain the greatest proportion of radionuclides) from the bulk of the phosphogypsum.[110]

While the two acid digestion processes are more complicated and costly, they can remove nearly all of the radioactive constituents. The acid digestion processes are similar to one another; the primary difference between the processes is whether anhydrite ($CaSO_4$) or hemihydrate ($CaSO_4 \cdot \frac{1}{2}H_2O$) is used as a reaction intermediate in the purification sequence. Both processes can be applied to dihydrate phosphogypsum, although it must first be dehydrated with sulfuric acid.

During the anhydrite purification method, phosphogypsum is placed in concentrated sulfuric acid where it is dehydrated and reprecipitated as small anhydrite crystals. Most of the soluble ions are removed from the phosphogypsum, while the radium-226 is precipitated with the anhydrite. (Silica sand also remains with the solid anhydrite.) The anhydrite is rehydrated with a dilute solution of sulfuric acid at a temperature less than 43°C, and gypsum seed crystals are used to speed up the rate of hydration. The remaining anhydrite crystals, along with the radium-226, can be readily separated from the larger gypsum crystals, although some of the very small anhydrite crystals adhere to the surface of the gypsum crystals, which increases the radionuclide content of the purified phosphogypsum.

During the hemihydrate purification method, the hemihydrate slurry is cooled, purified gypsum seed crystals are added, and large crystals of purified phosphogypsum are produced. Most of the radionuclides remain in the hemihydrate crystals, and the large dihydrate phosphogypsum crystals are easily separated from the smaller hemihydrate crystals.

The dilute sulfuric acid, used to rehydrate the anhydrite or hemihydrate, contains phosphate value from the phosphogypsum that can be recovered at the phosphoric acid plant. Silica sand is removed from the slurry by hydraulic classification.

An approximately 99.5 percent pure phosphogypsum can be obtained using either of these two processes. The hemihydrate route gives a 1 pCi/g radiation level, while the anhydrite route gives a 3 pCi/g level. Natural gypsum typically contains 1 to 3 pCi/g radiation.

Current and Potential Use

In the literature reviewed by EPA, no evidence was found to indicate that any of the phosphoric acid facilities are currently purifying their phosphogypsum. Future use of the purification methods will primarily depend on how the regulations constrain the disposal and utilization of phosphogypsum (see section 12.5.2).

Of the three purification methods described above, the physical separation process has only limited potential use. Since the physical separation process will only remove 30 percent of the radium-226, the use of this process is limited to phosphogypsum containing 14 pCi/g or less of radium-226 (i.e., a 30 percent reduction from 14 pCi/g will yield 9.8 pCi/g). This is assuming that phosphogypsum with a radium-226 content of greater than 10 pCi/g could not be utilized (see 54 FR 13482, April 10, 1990).

Exhibits 12-7 and 12-8 summarize phosphogypsum radium-226 content on a regional and facility-specific basis. Facility-specific information was available for only 7 of the 21 phosphoric acid production facilities. It should be noted that phosphate ores processed in Louisiana, Mississippi, and Texas originate from Florida. The radium-226 content of the North Carolina phosphogypsum falls below the tentative threshold level of 10 pCi/g radium-226 and, therefore, would not require purification. Phosphogypsum generated in Florida, Idaho, Louisiana, and Mississippi have radium-226 concentration ranges too high for the physical separation process to purify more than a fraction of the phosphogypsum to a level below the threshold level. However, the phosphogypsum generated in Texas has a low enough radium-226 concentration that the method

[110] Pena, N., Utilization of the Phosphogypsum Produced in the Fertilizer Industry, UNIDO/IS.533, United Nations Industrial Development Organization (UNIDO), May 1985, p. 32

Exhibit 12-7
Effect of Purification Methods on Ra-226 Concentrations in Phosphogypsum, Listed by State

State	Phosphogypsum Generated in 1988 (MT)[a]	Observed Ra-226 Content in Phosphogypsum (pCi/g)[c]	Ra-226 Content After Purification by Physical Separation (pCi/g)	Ra-226 Content After Purification by Acid Digestion	
				Using Anhydrite Phosphogypsum (pCi/g)	Using Hemihydrate Phosphogypsum (pCi/g)
Florida	28,777,000	5.9 - 36[b,d]	4 - 27	3	1
Idaho	2,646,000	7.9 - 23[d]	6 - 16	3	1
Louisiana	7,280,000	1.4 - 257[d]	1 - 180	3	1
Mississippi	474,000	5.9 - 36[d,e]	4 - 27	3	1
North Carolina	5,425,000	4.3 - 4.8	8	3	1
Texas	1,157,000	13.2 - 15.0	9 - 10.5	3	1
Wyoming	836,000	—	—	3	1

(a) Company responses to EPA's "National Survey of Solid Wastes from Mineral Processing Facilities," conducted in 1989.
(b) 1989 Waste Characteristic data provided by industry in response to RCRA 3007.
(c) May, Alexander and John W. Sweeney, Assessment of Environmental Impacts Associated with Phosphogypsum in Florida, prepared for the U.S. Department of Interior, Bureau of Mines, RI 8639, p. 8.
(d) EG&G Idaho, Inc., Evaluation of Relative Hazards of Phosphate Products and Wastes, prepared for the U.S. Department of Energy, DOE Contract No. DE-AC07-76ID01570, March 1984, p. 18.
(e) The phosphate rock originates in central Florida.

Exhibit 2-8
Effect of Purification Methods on Re-226 Concentrations in Phosphogypsum, Listed by Facility

Facility	State	Phosphogypsum Generated in 1988 (MT/YR)(a)	Observed Re-226 Content in Phosphogypsum (pCi/g)(b)			Re-226 Content After Purification by Physical Separation (pCi/g)	Re-226 Content After Purification by Acid Digestion	
			Min	Med	Max		Using Anhydrite Phosphogypsum (pCi/g)	Using Hemihydrate Phosphogypsum (pCi/g)
Agrico in Uncle Sam	LA	4,100,000	—	—	—	—	3	1
Agrico in Donaldson	LA	2,000,000	80	182.5	63 - 80	63 - 180	3	1
Arcadian in Geismar	LA	800,000	1.4	15.5	1 - 14	1 - 14	3	1
CF Chemicals in Bartow	FL	140,000	—	—	—	—	3	1
Conserv in Nichols	FL	1,100,000	5.9	5.9	4	4	3	1
IMC Fertilizer in Mulberry	FL	8,800,000	19	27	13 - 26	13 - 26	3	1
JR Simplot in Pocatello	ID	1,457,000(c)	7.9	—	6 - 16	6 - 16	3	1
Texasgulf in Aurora	NC	5,425,230	4.3	4.5	3	3	3	1
Mobil Mining in Pasadena	TX	1,157,000	13.2	14.1	9 - 10.5	9 - 10.6	3	1

(a) Company responses to EPA's "National Survey of Solid Wastes from Mineral Processing Facilities," conducted in 1989.
(b) 1989 Waste Characteristic data provided by industry in response to RCRA 3007.
(c) Reported value is confidential; estimate made using average waste to product ratio and facility capacity.

of physical separation should be able to reduce the radium-226 concentration below the 10 pCi/g threshold in most of the phosphogypsum generated.

Therefore, it appears that only a small portion of phosphogypsum produced annually could be sufficiently purified by the physical separation technique. In order to reduce all the phosphogypsum to a level at or below the 10 pCi/g threshold, the purification methods using acid digestion would be required.

Factors Affecting Regulatory Status

The residuals generated by the acid digestion purification of phosphogypsum have a specific activity of up to 600 pCi/g[111], and while the purification process generates a relatively low volume of waste, it is very concentrated and may pose disposal problems that equal or outweigh those associated with the original phosphogypsum. At this time, however, EPA does not have sufficient information to articulate a position on the regulatory status of this residue. One waste management strategy which has been suggested for immobilizing the radionuclides is to blend it with waste phosphatic clay suspensions (slimes) and allow the mixture to solidify.[112] The discussion in Section 12.5.2 on utilization of phosphogypsum in mine reclamation provides an explanation of this approach.

While no information was found on the volume or radium-226 concentration of the waste resulting from the physical separation method, it too would produce residuals with relatively high concentrations of radium-226.

12.5.2 Utilization

Described below are a number of alternatives for utilizing phosphogypsum. Some of these uses, such as agriculture and mine reclamation, already utilize significant amounts of phosphogypsum. Other alternatives (e.g., use as a construction material) have been shown to be technically feasible, but for a variety of reasons have not moved beyond the developmental stage of field testing in the U.S.

At the time of this assessment, it is uncertain which, if any, of the uses discussed below will be allowed. EPA currently requires that phosphogypsum be disposed in stacks or mines, which precludes alternative uses of the material,[113] except for a limited class waiver for the agricultural use of phosphogypsum, which will be in effect until October 1, 1990. EPA has, however, announced a limited reconsideration of the rule requiring the disposal of phosphogypsum in stacks or mines, and has also given notice of a "proposed rulemaking by which EPA is proposing to maintain or modify the rule to, alternatively or in combination, (1) make no change to 40 CFR Part 61, subpart R, as promulgated on October 31, 1989, (2) establish a threshold level of radium-226 which would further define the term "phosphogypsum", (3) allow, with prior EPA approval, the use of discrete quantities of phosphogypsum for researching and developing processes to remove radium-226 from phosphogypsum to the extent such use is at least as protective of public health as is disposal of phosphogypsum in mines or stacks, or (4) allow, with prior EPA approval, other alternative use of phosphogypsum to the extent such use is at least as protective of public health as is disposal of phosphogypsum in mines or stacks."[114]

[111] Moisset, J., Location of Radium in Phosphogypsum and Improved Process for Removal of Radium from Phosphogypsum, Platres Lafarge (France) (date not known).

[112] Palmer, J.W. and J.C. Gaynor, Method for Solidifying Waste Slime Suspensions, U.S. Patent 4,457,781 to USG Corporation, July 3, 1984, p. 4.

[113] 54 FR 51654, December 15, 1989.

[114] 55 FR 13482, April 10, 1990.

With respect to these four regulatory options, this report does not discuss options (1) or (3), other than to say that option (1) would preclude all of the alternative uses, with the possible exception of mine reclamation, and that it is unlikely that the option (3) would result in a significant reduction in the amount of phosphogypsum requiring disposal in mines or stacks.

Utilization of Phosphogypsum in Agriculture

Description

Phosphogypsum has been used in agriculture as a source of calcium and sulfur for soils that are deficient in these elements. Phosphogypsum is also incorporated into soils in order to provide sediment control for soils that have been eroded and leached to the point where they have developed a compacted crust. In addition, phosphogypsum is sometimes incorporated into acidic soils to serve as a buffering agent.

Phosphogypsum is sometimes pelletized before being applied to the soil, though the majority of phosphogypsum used for agricultural purposes is taken directly from disposal stacks, transported to local fertilizer companies, and distributed to the farmers. When the phosphogypsum is used as a fertilizer it is simply spread on the top of the soil, whereas when it is used for pH adjustment or sediment control it is tilled into the soil.

Current And Potential Use

It is estimated that 1,260,000 metric tons of gypsum are used in agriculture each year.[115] Of this amount, approximately 221,000 metric tons is from phosphogypsum stacks, 318,000 metric tons is from by-product gypsum processors, and 721,000 metric tons is from natural gypsum mines and quarries.[116]

As discussed above, EPA currently requires that phosphogypsum be disposed in stacks or mines, although a limited class waiver for agricultural use of phosphogypsum is in effect until October 1, 1990. After October 1, 1990, agricultural uses of phosphogypsum will not be allowed unless EPA decides to implement regulatory options (2) or (4) identified above.

If a threshold level of radium-226 is established (regulatory option (2)), it may be possible to utilize the phosphogypsum after purification (i.e., reducing the radium-226 content) (see section 12.5.1). If the physical separation method described in section 12.5.1 were used to purify phosphogypsum, the data displayed in Exhibits 12-7 and 12-8 suggest that some of the phosphogypsum generated in the states of Florida, Idaho, Louisiana, Mississippi, North Carolina, and Texas might have a radium-226 content below the threshold level of 10 pCi/g. However, the available data are not detailed enough for EPA to estimate how much of the purified phosphogypsum at each facility would fall below the threshold level. If either of the acid digestion purification methods (see section 12.5.1) were used to purify the phosphogypsum, the data in Exhibits 12-8 and 12-9 suggest that all of the phosphogypsum generated in the U.S. would have radium-226 concentrations below the threshold level.

Factors Relevant to Regulatory Status

A 1978 radiological assessment of the application of phosphogypsum to vegetable crop land concluded that there is little reason for concern regarding potential radiological hazards from the uptake of radium-226 by vegetable plants grown in soils treated with phosphogypsum.

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[115] McElroy, Christopher J., Petition of United States Gypsum Company for Partial Reconsideration and Clarification, and Opposition of United States Gypsum Company to the Petition for Partial Reconsideration and Request for Stay of the Fertilizer Institute, United States Gypsum Company, February 9, 1990.

[116] Ibid.

In a different study, data on the radium-226 content of phosphogypsum samples from Florida and Idaho were used to calculate the increase in radium-226 content of soil to which phosphogypsum is applied. The study found that the application of 1 metric tons of 40 pCi/g phosphogypsum to 1 hectare of land, and mixed in the soil to a depth of 20 cm, would increase the radium-226 content of the soil by 0.01538 pCi/g. Therefore, the application of phosphogypsum for the purpose of sulfur fertilization (assuming an application rate of 0.1 metric tons per hectare per year) would result in an increase in the soil's radium-226 content of 0.0015 pCi/g-year, while the application of phosphogypsum for the purpose of sediment control (assuming an application rate of 4.0 metric tons per hectare per year) would result in an increase in the soil's radium-226 content of 0.62 pCi/g-year. Over a period of 100 years, these application rates would cause radium-226 concentrations to increase by 0.15 and 6.2 pCi/g, respectively, as compared to the typical radium-226 content in soils of 1-2 pCi/g.[117]

Feasibility

It is uncertain whether future regulations will completely preclude the agricultural uses of phosphogypsum, or only limit when and how it may be used.[118] Since many farmers have continued to use phosphogypsum despite the prospect of new regulatory prohibitions, and concerns about the radium-226 found in phosphogypsum,[119] it is not unreasonable to assume that farmers would continue to use it in the future, if it remains economically competitive. However, if it becomes necessary to reduce the radium-226 content before it can be used, the additional costs are likely to reduce the amount of phosphogypsum used if purification would make phosphogypsum more expensive than the materials it competes with.

Utilization of Phosphogypsum for Mine Reclamation

Description

An alternative to the direct disposal of phosphogypsum in stacks and/or mines has been developed in which phosphogypsum is mixed with phosphatic clay suspension (a waste stream from the beneficiation of phosphate rock), and placed in a disposal site (generally the phosphate mine) where it consolidates and can be reclaimed by planting grass and trees.[120] The process begins by increasing the solids content of the phosphatic clay suspension to 10 percent; a portion of the dewatered clay is pumped to the phosphoric acid plant and mixed with phosphogypsum from the belt-filters; the clay-phosphogypsum mixture (blend) is put into a blend tank and additional phosphogypsum from the stacks and phosphatic clay suspension are added until there are approximately 3 parts phosphogypsum to 1 part clay; the resulting blend (35 percent solids) is pumped as a slurry to the disposal site; and after the blend has had approximately one year to dewater and consolidate, it is possible to plant grass and trees on the surface.[121]

[117] Burau, R.G., Agricultural Impact of Radium-226 in Gypsum Derived from Phosphate Fertilizer Manufacture, October 1976.

[118] 55 FR 13482 April 10, 1990.

[119] Personal communication, Dr. Gary Gascho, University of Georgia Experiment Station, April 25, 1990.

[120] Palmer, Jay W. and A.P. Koulohetis, Slimes Waste Solidification with Hydratable Calcium Sulfate, paper to be presented at the University of Miami Civil Engineering Department Seminar on Phosphogypsum on April 25-27, 1984, p. 279.

[121] Personal communication, William A. Schimming, Environmental Affairs Manager, Texasgulf Inc., April 30, 1990.

Current and Potential Use

Only Texasgulf's facility in Aurora, North Carolina is known to be using this management practice. To date, Texasgulf has used the phosphogypsum-clay blend to reclaim a 400 acre[122] portion of a phosphate mine adjacent to the facility, and is currently utilizing phosphogypsum at about the same rate as it is being generated.[123]

In considering whether any of the other 18 facilities could utilize their phosphogypsum in this way, there are at least two factors which need to be considered. The first factor is that the phosphoric acid plant be located near enough to the disposal site to keep transportation costs to a minimum. The second factor is that the phosphatic clay suspension contain sufficient base (e.g., calcium carbonate) to neutralize the acids in the phosphogypsum. Some of the facilities in Idaho and Florida may be close enough to their mines to utilize their phosphogypsum (total of 45,777,691 metric tons in 1988)[124] for mine reclamation, although this is not at all certain. The facilities in Louisiana, Mississippi, and Texas could not use this option to utilize their phosphogypsum (8,911,000 metric tons in 1988)[125] because their phosphate rock is mined in central Florida, nor could the Chevron Chemical facility in Rock Springs, Wyoming (836,000 metric tons phosphogypsum in 1988),[126] because its phosphate rock is mined in Utah. EPA does not know whether any of the phosphatic clay suspensions generated outside of North Carolina are sufficiently basic to neutralize the acids in the phosphogypsum.

Factors Relevant to Regulatory Status

EPA believes that the utilization of phosphogypsum to reclaim mines may have a number of advantages over the current practice of placing it in stacks or mines. Specifically, having grass and trees growing over the reclaimed mine will reduce the potential for the waste to be released to surface water by erosion, or to the atmosphere as wind blown dust. It should also reduce the demand for surface impoundments needed for the disposal of phosphatic clay suspension. Finally, the reclaimed disposal sites will be more aesthetically pleasing than the stacks and mines currently used to dispose phosphogypsum. While there are no obvious disadvantages, contaminant releases from areas reclaimed in this manner, particularly to ground water is a potential problem. EPA has not found any information regarding the migration of hazardous constituents from the phosphogypsum-clay blend into ground or surface waters.

The radiological and chemical composition of the phosphogypsum-clay blend will vary widely, due to differences in phosphate ore and manufacturing processes. Texasgulf believes that its phosphogypsum-clay blend has approximately the same radionuclide concentrations as the original phosphogypsum.[127] This belief is consistent with data from central Florida in which the concentration of radium-226 is 23.8 pCi/g in phosphatic clay suspensions, and 25.9 pCi/g in the phosphogypsum.[128] While not much data on the chemical, radiological, or physical characteristics of the phosphogypsum-clay blend is currently available, North Carolina State University's, Department of Soil Science is reportedly in the process of investigating these issues.[129]

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[122] The filled area was approximately 35 feet deep.

[123] Schimming, op. cit.

[124] Ibid.

[125] Company responses to EPA's "National Survey of Solid Wastes from Mineral Processing Facilities," conducted in 1989.

[126] Ibid.

[127] Schimming, op. cit.

[128] Palmer, J.W. and A.P. Kouloheris, Slimes Waste Solidification with Hydratable Calcium Sulfate, Paper to have been presented at the University of Miami Civil Engineering Department Seminar on Phosphogypsum, April 25-27, 1984, p. 278.

[129] Schimming, op. cit.

Feasibility

It is likely that this management alternative will have a greater level of social acceptability than current practices, which result in large, barren disposal areas. EPA does not believe that the rule requiring that phosphogypsum be disposed in stacks or mines (thereby precluding alternative uses of the material) will preclude the use of this alternative, since it does not involve putting the phosphogypsum-clay blend anywhere except in stacks and mines.[130] The greatest barriers to the use of this alternative appear to be geographic and technical in nature (see the discussion on Current and Potential Use), although there may also be some economic barriers (e.g., current practices are less expensive).

Utilization of Phosphogypsum in Construction Materials

Phosphogypsum can be utilized as a construction material in a variety of ways. The two major areas of use are in building materials and highway construction. This section describes and evaluates applications in both areas.

Description

Phosphogypsum has the same basic properties as natural gypsum and may be used as a substitute for natural gypsum in the manufacture of commercial construction products. Approximately 70 percent of the natural gypsum used in the U.S. is for the manufacture of gypsum board or partition panels. Another 19 percent is used as an additive to cement. Addition of natural gypsum to cement retards the setting time, counteracts shrinkage, speeds the development of initial strength, and increases long-term strength and resistance to sulfate etching. The remaining 11 percent of all natural gypsum use is attributable to agricultural uses (7 percent) and miscellaneous uses including the manufacture of plaster and cement.[131] Phosphogypsum generated from the classic Prayon process for phosphoric acid production must be purified by removing phosphates, fluorides, and other impurities for it to be successfully used in the production of building materials or as an additive to cement, whereas phosphogypsum from the Central-Prayon, Nissan-H, and Nissan-C processes may often be used directly as natural gypsum substitutes without the need for purification.

Phosphogypsum from all four processes may often be used in the manufacture of cement without additional purification. One of the most promising processes for utilizing phosphogypsum in the manufacture of portland cement is the OSW-Krupp process, a modification of the Müeller-Kühne process. In this process, phosphogypsum is dried in a rotary dryer and mixed with coke, sand, and clay. The mixture is then ground, pelletized, and fed to a rotary kiln where SO_2 and clinker are formed. The SO_2 can then be passed to an acid conversion plant to produce H_2SO_4, which may be recycled to the phosphoric acid production process. The clinker is cooled and metered along with natural gypsum onto a belt conveyor feeding into a finished cement mill.[132]

Phosphogypsum generated from all phosphoric acid production processes may be used successfully as a road base, when stabilized with 5-10 percent portland cement or 15-25 percent fly ash, mixed with granular soil and compacted for secondary road construction, used in a portland cement concrete mixture and compacted to form roller-compacted concrete for paving driveways and parking areas, or used as fill and sub-base material.[133,134]

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[130] 54 FR 51654 December 15, 1989.

[131] Chang, W.F. and Murray I. Mantell, Engineering Properties and Construction Applications of Phosphogypsum, Phosphate Research Institute, University of Miami Press, Coral Gables, Florida, 1990, p. 6.

[132] Zellars-Williams Company, A.P. Kouloheris, principal investigator, Evaluation of Potential Commercial Processes for the Production of Sulfuric Acid From Phosphogypsum, Publication No. 01-002-001, Florida Institute of Phosphate Research, October 1981, pp. 18, 22.

[133] Ibid., pp. 177-189.

Current and Potential Uses

Currently, there are no major uses of phosphogypsum in the U.S. in the manufacture of building materials or in highway construction due to the low- cost availability of other suitable materials and to the ban on utilization of phosphogypsum under 40 CFR part 61, subpart R, National Emission Standards for Hazardous Air Pollutants, Radon Emissions from Phosphogypsum Stacks.

The U.S. has led the world in the mining of natural gypsum, with 20 percent of total world output. The cost of purifying and dewatering phosphogypsum and the relative abundance of natural gypsum has historically discouraged the development of phosphogypsum as a replacement for gypsum in the manufacture of building materials in the U.S.[135] It is unlikely that there will be a significant increase in the utilization of phosphogypsum in this capacity as long as there is a relatively abundant, low-cost supply of natural gypsum in the U.S.

Utilization of phosphogypsum in the production of H_2SO_4 and cement clinker would be possible in Florida. This application is most feasible where there is a shortage of sulfur and a high demand for cement. Its potential for success in Florida depends upon the sulfur market and the ability of a fertilizer company to market the cement clinker produced.[136]

Phosphogypsum has been successfully used on an experimental basis for paving and highway construction in both Texas and Florida. Phosphogypsum from Mobil's facility in Pasadena was stabilized with fly ash or portland cement and used as a road base on five test sections of city streets in La Porte, Texas.[137] In Polk County, Florida, the use of phosphogypsum as road base was demonstrated on a 2.4 km (1.5 mile) stretch of road, where it was mixed with granular soil and compacted prior to installation.[138] Another demonstration of using phosphogypsum as a road base occurred in Columbia County, Florida, where both 100 percent dihydrate phosphogypsum and mixtures of phosphogypsum-sand were used in a 2 mile stretch of road.[139] Phosphogypsum was also used as a component (13 percent) of roller-compacted concrete, which was used to pave 2,000 square yards of driveways and parking areas at the Florida Institute of Phosphate Research in Bartow, Florida.[140]

The actual commercial use of phosphogypsum as a road sub-base material has been demonstrated on a small scale in both Florida and North Carolina. In Florida it was used as sub-base roads at phosphorous processing facilities in central Florida, and as limestone substitute in the road sub-base of a section of blacktop road. In North Carolina it has been used as fill and sub-base in roads crossing swampy areas.[141]

Factors Affecting Regulatory Status

The primary regulatory concerns with respect to the disposal and utilization of phosphogypsum stem from its radium-226 content. The radium-226 is of sufficient concern that EPA currently requires phosphogypsum to be disposed of in a stack or mine, thereby precluding all of the construction uses discussed

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134(...continued)

134 Collins, R.J. and R.H. Miller, Availability of Mining Wastes and Their Potential for Use as Highway Material - Volume I: Classification and Technical and Environmental Analysis, FHWA-RD-76-106, prepared for Federal Highway Administration, May 1976, p. 146.

135 Fitzgerald, J.E., Jr. and Edward L. Sensintaffar, "Radiation Exposure from Construction Materials Utilizing Byproduct Gypsum from Phosphate Mining", (date not known), p. 353.

136 Kouloheris, op. cit., p. 16.

137 Chang, op. cit., p. 177.

138 Ibid., p. 178.

139 Ibid., p. 183.

140 Ibid., pp. 186-187.

141 Collins, op. cit. p. 146.

above. As is discussed at the beginning of this section, EPA is currently considering a number of regulatory options, two of which could conceivably allow phosphogypsum to be utilized in construction.

If a threshold level of radium-226 is established (regulatory option (2)), it may be possible to utilize the phosphogypsum after purification (i.e., reducing the radium-226 content) (see section 12.5.1). Assuming that the proposed threshold level of 10 pCi/g were adopted, and the physical separation method described in section 12.5.1 were used to purify the phosphogypsum, the data displayed in Exhibits 12-7 and 12-8 suggest that some of the phosphogypsum generated in the states of Florida, Idaho, Louisiana, Mississippi, North Carolina, and Texas might have a radium-226 content lower than the threshold value of 10 pCi/g. However, the available data are not detailed enough for EPA to estimate how much of the purified phosphogypsum would contain less radium-226 than the threshold level, or if phosphogypsum with a sufficiently low radium-226 concentration would be close enough to the potential markets for it to be economically competitive. Similarly, if one of the acid digestion purification methods (see section 12.5.1) were used to purify the phosphogypsum, the data in Exhibits 12-7 and 12-8 suggest that all of the phosphogypsum generated in the U.S. would have radium-226 concentrations lower than the threshold level.

It is not clear whether adoption of the fourth regulatory option would preclude the use of phosphogypsum in construction materials. It is likely that the determination of whether a particular use of phosphogypsum is at least as protective of human health and the environment as phosphogypsum disposal in stacks or mines, would have to be made on a case by case basis.

Feasibility

Even if it is allowed by the regulations, it is uncertain whether a significant amount of phosphogypsum would be utilized as a construction material. The basis for this conclusion is that even before the current constraints on the utilization of phosphogypsum were imposed, very little phosphogypsum has been used in construction; consumer concern over indoor radon is likely to discourage the use of products made from phosphogypsum, which may be perceived as a significant source of radon even if purified; natural gypsum is readily available in most parts of the U.S.; and there is concern about the exposure (e.g., via leaching and subsequent ingestion, see section 12.3.1) of humans to the hazardous constituents in phosphogypsum.

12.6 Cost and Economic Impacts

Section 8002(p) of RCRA directs EPA to examine the costs of alternative practices for the management of the special wastes considered in this report. EPA has responded to this requirement by evaluating the operational changes that would be implied by compliance with three different regulatory scenarios, as described in Chapter 2. In reviewing and evaluating the Agency's estimates of the cost and economic impacts associated with these changes, it is important to remember what the regulatory scenarios imply, and what assumptions have been made in conducting the analysis.

The focus of the Subtitle C compliance scenario is on the costs of constructing and operating hazardous waste land disposal units. Other important aspects of the Subtitle C system (e.g., corrective action) have not been explicitly factored into the cost analysis. Therefore, differences between the costs estimated for Subtitle C compliance and those under other scenarios (particularly Subtitle C-Minus) are less than they might be under an alternative set of conditions (e.g., if most affected facilities were not already subject to Subtitle C). The Subtitle C-Minus scenario represents, as discussed above in Chapter 2, the minimum requirements that would apply to any of the special wastes that are ultimately regulated as hazardous wastes; this scenario does not reflect any actual determinations or preliminary judgments concerning the specific requirements that would apply to any such wastes. Further, the Subtitle D-Plus scenario represents one of many possible approaches to a Subtitle D program for mineral processing special wastes, and has been included in this report only for illustrative purposes. The cost estimates provided below for the three scenarios considered in this report must be interpreted accordingly.

In accordance with the spirit of RCRA §8002(p), EPA has focused its analysis on impacts on the firms and facilities generating the special wastes, rather than on net impacts to society in the aggregate. Therefore, the cost analysis has been conducted on an after-tax basis, using a discount rate based on a previously developed estimate of the weighted average cost of capital to U.S. industrial firms (9.49 percent), as discussed in Chapter 2. Waste generation rate estimates (which are directly proportional to costs) for the period of analysis (the present through 1995) have been developed in consultation with the U.S Bureau of Mines.

In this section, EPA first outlines the way in which it has identified and evaluated the waste management practices that would be employed under different regulatory scenarios by facilities producing wet process phosphoric acid. Next, the section discusses the cost implications of requiring these changes to existing waste management practices. The last part of the section discusses and predicts the ultimate impacts of the increased waste management costs faced by the affected facilities.

12.6.1 Regulatory Scenarios and Required Management Practices

Because the available data indicate that process wastewater and phosphogypsum may exhibit the hazardous waste characteristics of EP toxicity and/or corrosivity, these materials would in many cases be regulated as hazardous wastes under RCRA Subtitle C were it not for the the Mining Waste Exclusion. A decision by EPA that Subtitle C regulation is appropriate for these wastes would therefore result in incremental waste management costs. Accordingly, the Agency has estimated the incidence, magnitude, and impacts of these costs for the facilities that generate process wastewater and phosphogypsum from wet process phosphoric acid production; this analysis is presented in the following paragraphs.

EPA has adopted a conservative approach in conducting its cost analysis for the wastes generated by the phosphoric acid sector. The Agency has assumed that process wastewater would exhibit EP toxicity and corrosivity at all facilities unless actual sampling and analysis data demonstrate otherwise; EPA's waste sampling data, indicate that process wastewater exhibits at least one characteristic of hazardous waste at all facilities from which sampling data are available. Furthermore, because of current co-management of process waters at phosphoric acid facilities, the Agency has assumed that all process wastewaters managed at the facilities have similar chemical characteristics, that is, all circulating process water is assumed to be corrosive and/or EP toxic. In reality, the aggregate process wastewater stream may be separated into different process streams; only those that are potentially hazardous would require treatment. EPA's estimated compliance costs for managing process wastewater may, therefore, be overstated.

Similarly, in following a conservative approach, the Agency has assumed that phosphogypsum would exhibit EP toxicity at all facilities unless actual sampling and analysis data demonstrate otherwise. EPA's waste sampling data indicate that EP toxicity is not exhibited at 10 of facilities that generate the material; the Agency's cost and impact analysis of phosphogypsum management is, therefore, limited to eleven facilities, only one of which was both sampled and at which phosphogypsum constituent concentrations exceed one or more of the EP toxicity regulatory levels.

The Agency has estimated the costs associated with Subtitle C regulation, as well as with two somewhat less stringent regulatory scenarios, referred to here as "Subtitle C-Minus" and "Subtitle D-Plus" (a more detailed description of the cost impact analysis and the development of these regulatory scenarios is presented in Chapter 2, above). In the following paragraphs, EPA discusses the assumed management practices that would occur under each regulatory alternative.

Process Wastewater

Subtitle C

Under Subtitle C standards, hazardous waste that is managed on-site must meet the standards codified at 40 CFR Parts 264 and 265 for hazardous waste treatment, storage, and disposal facilities. The Agency has assumed that the process wastewater and the phosphogypsum can and will be managed separately; non-hazardous process water is assumed to be used to transport the phosphogypsum to the management unit. Because phosphoric acid production process wastewater is a dilute, aqueous liquid, that is usually corrosive and often EP toxic, the management practice of choice under Subtitle C is treatment (neutralization and/or metals precipitation). The scenario examined here involves construction of a Subtitle C surge pond (double-lined surface impoundment) which feeds a system of concrete impoundments in which treatment is performed. Following treatment, the effluent may be reused by the facility (e.g., to slurry fluorogypsum to the gypsum stack or impoundment) just as it is under current practice. The sludge is assumed to be non-hazardous and is assumed to be disposed of in an unlined disposal impoundment or landfill.

Subtitle C-Minus

Assumed practices under Subtitle C-Minus are identical to those described above for the full Subtitle C scenario, with the exception that some of the requirements for construction and operation of the hazardous waste surge pond have been relaxed, most notably the liner design requirements.

Subtitle D-Plus

Assumed practices under Subtitle D-Plus are identical to those described above for the Subtitle C-Minus scenario. Generators of process wastewaters are assumed to pose either moderate or high risk to ground water, even if, as is true in one case in the phosphoric acid sector, the environmental conditions indicate a low risk. Therefore, all facilities meet the same requirements under both Subtitle D-Plus and under Subtitle C-Minus; ground-water monitoring, a practice that is not required under the low risk Subtitle D-plus scenario, is assumed to be required in all cases.

Phosphogypsum

Subtitle C

Under Subtitle C standards, of hazardous waste that is managed on-site must meet the standards codified at 40 CFR Parts 264 and 265 for hazardous waste treatment, storage, and disposal facilities. The Agency has assumed that the phosphogypsum can and will be managed separately from the other special waste, process wastewater; non-hazardous process wastewater is assumed to be used to transport the phosphogypsum to the management unit. Because phosphogypsum is an inorganic solid that is transported in slurry form, the management practice of choice under Subtitle C is surface impoundment disposal. EPA has determined that because of Subtitle C closure requirements, existing waste management units (gypsum stacks) would not be permissible, because of the steep (nearly vertical) angles with which they are constructed. Closure of such units would require extensive contouring and regrading (so that they could be capped effectively), such that the total area occupied by the unit at closure would greatly exceed the space occupied during its operating life. The scenario examined here involves construction of a double-lined Subtitle C surface impoundment of significant size. The gypsum would be slurried to this impoundment in much the same way as it is currently slurried to gypsum stacks. Following settling of the suspended phosphogypsum, the transport water would be removed and piped back to the process operation for reuse, just as it is under current practice.

Subtitle C-Minus

Two primary differences are assumed to exist between full Subtitle C and Subtitle C-minus. The first is the assumption that facilities could use gypsum stacks if their use is less costly than using disposal impoundments. The second difference is the facility-specific application of tailored requirements based on potential risk to groundwater at affected facilities. Under the C-Minus scenario, as well as the Subtitle D-Plus scenario described below, the degree of potential risk of contaminating ground-water resources was used as a decision criterion in determining what level of protection (e.g., liner and closure cap requirements) would be necessary to protect human health and the environment. Ten of the 11 facilities assumed to generate potentially hazardous phosphogypsum were determined to have a high potential to contaminate ground-water resources; the eleventh was considered a low risk location.

When risk to ground water is high, facilities are assumed to be required to manage the waste in stacks lined with double synthetic liners and leachate collection and detection systems. As none of the ten facilities in high risk locations currently operate this type of unit, all would, under Subtitle C-minus, be required to build new stacks. In addition to the double composite liners, the stacks in high risk locations are required to have run-on/run-off controls and ground-water monitoring wells; both practices must be continued through the post-closure care period. In addition, the units must undergo formal closure, including a cap of topsoil and grass over a composite liner. Post-closure care must be maintained (e.g., mowing and general cap maintenance, and ground-water monitoring) for a period of 30 years.

At three of the ten facilities, where depth to groundwater allows for relatively deep impoundment construction, surface impoundment disposal of phosphogypsum is estimated to be the least cost management alternative. Composite-lined impoundments, requiring composite caps at closure, were assumed to be used at these facilities.

Chevron's Wyoming facility, the only facility in a low risk area (and the only facility at which phosphogypsum samples were determined to be EP toxic) was allowed to continue using its currently operating unit; the operator was assumed, however, to be required to install a ground-water monitoring system.

Subtitle D-Plus

As under both Subtitle C scenarios, facility operators under the Subtitle D-Plus scenario would be required to ensure that hazardous contaminants do not escape into the environment. Like the Subtitle C-Minus scenario, facility-specific requirements are applied to allow the level of protection to increase as the potential risk to ground water increases. Under Subtitle D-Plus, the facilities are also allowed to operate gypsum stacks. The stacks do not require capping at closure under this scenario, under the assumption that the natural crusting of the gypsum that occurs as the material dries would be adequately protective. Because no capping, and therefore, no reduced slope angles, are required, the stacks are built with the same dimensions as the currently operating stacks, minimizing the total basal area required and, therefore, potentially decreasing the cost of compliance. Stacks at the ten high-risk facilities are assumed to require composite liners, single leachate collection systems, and ground-water monitoring. The one low-risk facility is assumed to continue operating its current stack. All eleven facilities are assumed to be required to install run-on/run-off controls and would continue the practice through the post-closure care period.

12.6.2 Cost Impact Assessment Results

Process Wastewater

Results of the cost impact analysis for the process wastewater generated by phosphoric acid facilities are presented by facility and regulatory scenario in Exhibit 12-9. Of the 21 facilities generating process wastewater, all are expected to incur costs under the Subtitle C regulatory scenario. Under this scenario, the annualized regulatory compliance costs would be $3.2 to $26.3 million greater than the baseline waste management costs, with a sector total of $225 million per year over baseline costs. Annualized new capital expenditures range from $1.1 to 11.7 million with a sector total of $101.8 million. At the majority of the facilities, capital costs account for 45 percent of the total annualized compliance cost, with the cost of wastewater tank treatment dominating overall costs.

Under the Subtitle C-Minus and D-Plus scenarios, the annualized compliance costs drop only slightly, due to relaxed technical standards for operation of the surge ponds used to hold the wastewater prior to treatment. Annualized compliance costs under Subtitle C-Minus range from $3.0 to $25.6 million; the sector total is estimated to be $215 million. Annualized costs under Subtitle D-Plus are nearly identical, with a

Exhibit 12-9
Compliance Cost Analysis Results for Management of Process Wastewater from Phosphoric Acid Production[a]

Facility	Baseline Waste Management Cost	Incremental Costs of Regulatory Compliance								
		Subtitle C			Subtitle C-Minus			Subtitle D-Plus		
	Annual Total ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)
Agri Chem - Bartow, FL	286	5,849	15,488	2,311	5,537	13,781	2,056	5,434	13,781	2,056
Agrico Chemical - Donaldsonville, LA	287	12,131	39,213	5,851	11,677	36,708	5,477	11,677	36,708	5,477
Agrico Chemical - Mulberry, FL	288	11,098	32,239	4,811	10,654	29,795	4,446	10,551	29,795	4,446
Agrico Chemical - Uncle Sam, LA	314	15,541	50,321	7,509	14,975	47,193	7,042	14,872	47,193	7,042
Arcadian - Geismar LA	247	5,375	16,160	2,414	5,162	15,022	2,241	5,059	15,022	2,241
Central Phosphates - Plant City, FL	328	22,313	68,915	10,283	21,080	62,058	9,260	21,080	62,058	9,260
CF Chemicals - Bartow, FL	608	6,950	19,436	2,900	6,610	17,578	2,623	6,507	17,578	2,623
Chevron - Rock Springs, WY	281	4,760	12,439	1,856	4,504	11,043	1,648	4,402	11,043	1,648
Conserv - Nichols, FL	261	3,213	8,004	1,194	3,048	7,110	1,061	2,946	7,110	1,061
Farmland Industries - Bartow, FL	265	6,817	18,332	2,735	6,465	16,399	2,447	6,362	16,399	2,447
Gardinier - Riverview, FL	635	16,544	51,094	7,624	15,633	46,047	6,871	15,530	46,047	6,871
IMC Fertilizer - Mulberry, FL	326	26,309	79,067	11,798	25,619	75,236	11,226	25,516	75,236	11,226
Mobil Mining - Pasadena, TX	276	8,023	24,179	3,608	7,638	22,068	3,293	7,535	22,068	3,293
Nu-South Industries - Pascagoula, MS	518	7,871	26,091	3,893	7,491	24,013	3,583	7,388	24,013	3,583
Nu-West - Soda Springs, ID	288	5,743	16,424	2,451	5,464	14,899	2,223	5,361	14,899	2,223
Occidental Chemical - White Springs, FL	624	12,769	36,856	5,499	12,256	33,912	5,060	12,153	33,912	5,060
Royster - Mulberry, FL	624	6,506	17,902	2,671	6,192	16,183	2,415	6,089	16,183	2,415
Royster - Palmetto, FL	549	10,719	36,137	5,392	10,197	33,262	4,963	10,094	33,262	4,963
Seminole Fertilizer - Bartow, FL	520	12,949	37,186	5,549	12,434	34,356	5,126	12,331	34,356	5,126
JR Simplot - Pocatello, ID	555	5,369	14,958	2,232	5,093	13,452	2,007	4,990	13,452	2,007
Texasgulf - Aurora, NC	303	18,166	62,169	9,276	17,393	57,893	8,638	17,290	57,893	8,638
Total:	8,897	225,033	682,629	101,857	215,121	628,007	93,706	213,167	628,007	93,706
Average:	424	10,716	35,608	4,850	10,244	29,905	4,462	10,151	29,905	4,462

(a) Values reported in this table are those computed by EPA's cost estimating model and are included for illustrative purposes. The data, assumptions, and computational methods underlying these values are such that EPA believes that the compliance cost estimates reported here are precise to two significant figures.

Facilities evaluated here as generating potentially hazardous waste include those for which no sampling data exists.

sector total estimated at $213 million; the slight difference is due to differences in assumed permitting requirements and associated costs.

Phosphogypsum

Results of the cost impact analysis for the phosphogypsum generated by phosphoric acid producers are presented by facility and regulatory scenario in Exhibit 12-10. Of the 21 facilities generating phosphogypsum, a maximum of 11 may generate potentially hazardous waste and incur costs under the Subtitle C regulatory scenario. Under this scenario, the annualized regulatory compliance costs would range, for those eleven facilities, from $10.8 million to $185 million over and above baseline waste management costs, with a sector total of $684 million per year. Annualized new capital expenditures account for the vast majority (80 percent) of incremental costs, ranging from $8.4 million to $147 million greater than baseline, with a sector total of $542 million. The primary reason for these extreme compliance-related capital expenditures is the large size of the Subtitle C disposal impoundments that would be needed to contain a 15 year accumulation of phosphogypsum at most facilities.

Under the less rigorous, risk related technical requirements of the Subtitle C-Minus scenario, the annualized compliance costs would be $1.2 million to $65.3 million greater than the baseline waste management costs, with a sector total of $216.7 million per year. Annualized new capital expenditures would range from $0.4 to $51.2 million, with a sector total of $171 million. The decrease in compliance costs between the two Subtitle C scenarios is primarily a function of the assumption that modified stacks could be used under the Subtitle C-Minus scenario; the primary design modification involves a decrease in the slope of the stacks to allow for effective capping at closure. In addition, facilities located in low risk areas (one in this sector) could continue to operate their current stacks, and would simply be required to retrofit run-on/run-off controls and install ground-water monitoring systems. Facilities in high risk areas (the remaining ten facilities), incur higher costs due to requirements for double liners/leachate collection systems, increased basal area due to limitations on slope, and capping at closure. For three facilities, the costs of building new stacks that complied with these requirements were estimated to be higher than those of building similarly protective disposal impoundments; accordingly, for costing purposes, these facilities were assumed to build impoundments rather than gypsum stacks.

Under the Subtitle D-Plus regulatory scenario, the annualized compliance costs would be $0.48 to $62.2 million greater than the baseline waste management costs, with a sector total of $48.7 million per year. Annualized new capital expenditures would range from $0.1 to $52 million, with a sector total of $166 million. The distribution of costs is identical to that of the C-Minus scenario, while the overall magnitude of the costs is about 25 percent less. The primary reason for the decrease is that, because no capping is required, facilities can operate stacks with slopes identical to current practices; this reduces the basal area needed and hence, the costs of liners and leachate collection systems. In addition, the actual costs of capping are not incurred. As under Subtitle C-Minus, the one facility located in a low risk area is assumed to continue operating its current stack, but would retrofit needed controls. Ground-water monitoring is not required for this facility, due to its low risk location.

12.6.2 Financial and Economic Impact Assessment

In order to evaluate the ability of affected facilities to bear these estimated regulatory compliance costs, EPA performed an impact assessment which consists of three steps. First, the Agency compared the estimated compliance costs to the financial strength of each facility, to assess the relative magnitude of the financial burden that would be imposed in the absence of changes in supply, demand, or price. Next, EPA conducted a qualitative evaluation of the salient market factors which affect the competitive position of the phosphoric acid producers, in order to determine whether compliance costs could be passed on to labor markets, suppliers of raw materials, or consumers. Finally, the Agency combined the results of the first two steps to predict the net compliance-related economic impacts which would be experienced by the facilities

Exhibit 12-10
Compliance Cost Analysis Results for Management of Phosphogypsum from Phosphoric Acid Production[a]

Facility	Baseline Waste Management Cost	Incremental Costs of Regulatory Compliance								
		Subtitle C			Subtitle C-Minus			Subtitle D-Plus		
	Annual Total ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)	Annual Total ($ 000)	Total Capital ($ 000)	Annual Capital ($ 000)
Agri Chem - Bartow, FL	409	17,310	90,808	13,549	11,760	60,101	8,968	11,645	64,067	9,560
Agrico Chemical - Mulberry, FL	1,067	41,386	220,518	32,904	20,455	110,917	16,550	11,906	66,627	9,942
Agrico Chemical - Uncle Sam, LA	3,858	99,755	534,366	79,737	65,361	343,515	51,257	62,242	352,204	52,553
Central Phosphates - Plant City, FL	1,547	185,043	985,328	147,023	30,160	164,700	24,575	17,687	101,203	15,101
Chevron - Rock Springs, WY	434	10,885	56,316	8,403	1,278	2,698	402	483	875	131
Gardinier - Riverview, FL	694	117,107	621,515	92,738	21,409	114,562	17,094	12,750	70,161	10,469
Mobil Mining - Pasadena, TX	982	46,859	247,207	36,886	12,877	68,198	10,176	7,428	40,059	5,977
Nu-South Industries - Pascagoula, MS	710	62,428	330,400	49,300	13,060	69,338	10,346	7,414	40,255	6,007
Nu-West - Soda Springs, ID	1,011	11,989	62,746	9,363	8,063	41,055	6,126	7,960	41,055	6,126
Occidental Chemical - White Springs, FL	1,289	27,712	149,079	22,245	18,916	100,310	14,968	18,813	100,310	14,968
Royster - Palmetto, FL	334	64,115	338,993	50,582	13,362	70,715	10,562	7,661	41,498	6,192
Total:	13,112	684,588	3,637,296	542,730	216,736	1,146,105	171,013	166,168	918,313	137,024
Average:	1,192	62,235	330,663	49,339	19,703	104,191	15,547	15,106	83,483	12,457

(a) Values reported in this table are those computed by EPA's cost estimating model and are included for illustrative purposes. The data, assumptions, and computational methods underlying these values are such that EPA believes that the compliance cost estimates reported here are precise to two significant figures.

Facilities evaluated here as generating potentially hazardous waste include those for which no sampling data exists.

being evaluated. The methods and assumptions used in this analysis are described in Chapter 2 and in Appendices E-3 and E-4 to this report.

Financial Ratio Analysis

Process Wastewater

EPA believes that costs of compliance under full Subtitle C would have at least marginally significant impacts on all 21 facilities, as reflected by the screening ratio results in Exhibit 12-11. Annual compliance costs as a percent of value of shipments or value added are expected to be from one to five percent at 18 of the 21 facilities; for the remaining facilities, the screening ratio results range from five to seven percent. The compliance capital as a percent of annual sustaining capital is high for all 21 facilities, ranging from 14 to 73 percent. The financial impacts under prospective Subtitle C-Minus and D-Plus regulation would be similar in distribution and magnitude to those of the Subtitle C scenario.

Phosphogypsum

Regulation under Subtitle C would have a highly significant financial impact on any phosphoric acid facilities whose phosphogypsum is found to be hazardous (phosphogypsum was EP toxic at only one facility that was sampled, therefore, the remaining ten facilities for which costs were estimated might or might not actually experience impacts). As shown in Exhibit 12-12, the annualized incremental costs associated with waste management under Subtitle C represent 4 to 40 percent of both the value added and the value of shipments for all affected facilities generating potentially hazardous phosphogypsum. Moreover, the ratio of annual capital costs to annual sustaining capital investments also suggests severe impacts for these facilities, with screening ratio results ranging from 80 to 700 percent.

The financial impacts under Subtitle C-Minus regulation would be much less than under the full Subtitle C scenario. One facility, located in a low risk area, is estimated to incur no impacts under Subtitle C-Minus. Interestingly, this is the only facility for which waste sampling actually indicated EP toxicity. For the remaining ten facilities, impacts on the value of shipments or value added range from 3 to 13 percent.

Estimation of impacts under the Subtitle D-Plus scenario indicates that for three of the ten affected facilities, there is no difference from the Subtitle C-Minus scenario (the facility in the low risk area again experiences no impacts). One of the remaining seven facilities experiences only slightly lower impacts (5 percent less than C-Minus); the remaining six facilities experience reductions in the magnitude of impacts of 43 percent from the C-Minus scenario. Annualized capital as a percent of sustaining capital investments is high even under the Subtitle D-Plus scenario; screening ratio results for the ten affected facilities range from 55 to 229 percent.

Market Factor Analysis

General Competitive Position

The U.S. is the world's leading producer of phosphoric acid, the primary use of which is in fertilizers; other uses for phosphoric acid include nutrient supplements for animal feeds, builders for detergents, water softeners, additives for food, and pharmaceuticals. Domestic acid production is based on large quantities of high-quality phosphate rock reserves, located principally in Florida and North Carolina. These deposits provide abundant feedstock for high-quality phosphoric acid production. In recent years, Morocco has become the United State's main competitor in international markets. This competition has resulted in a downward price trenc for phos-ɔate in these markets. The fact that the U.S. is a major exporter of phosphate rock is an indication of the quality and relative cost of its phosphate reserves. However, low-cost, high-quality deposits do not guarantee profits in the phosphate rock and phosphoric acid markets. During difficult economic times, the use of phosphoric acid can decline despite being offered at a fairly low price. Fertilizer

Exhibit 12-11
Significance of Regulatory Compliance Costs for Management of Process Wastewater from Phosphoric Acid Production[(a)]

Facility	Subtitle C			Subtitle C-Minus			Subtitle D-Plus		
	CC/VOS	CC/VA	IR/K	CC/VOS	CC/VA	IR/K	CC/VOS	CC/VA	IR/K
Agri Chem - Bartow, FL	1.68%	1.87%	16.0%	1.60%	1.77%	14.2%	1.57%	1.74%	14.2%
Agrico Chemical - Donaldsonville, LA	3.06%	3.40%	35.5%	2.95%	3.28%	33.2%	2.95%	3.28%	33.2%
Agrico Chemical - Mulberry, FL	3.37%	3.74%	35.1%	3.23%	3.59%	32.4%	3.20%	3.56%	32.4%
Agrico Chemical - Uncle Sam, LA	2.83%	3.14%	32.8%	2.73%	3.03%	30.6%	2.71%	3.01%	30.6%
Arcadian - Geismar, LA	3.67%	4.08%	38.6%	3.53%	3.92%	36.8%	3.46%	3.84%	36.8%
Central Phosphates - Plant City, FL	3.91%	4.34%	43.2%	3.69%	4.10%	38.9%	3.69%	4.10%	38.9%
CF Chemicals - Bartow, FL	6.33%	7.03%	63.4%	6.02%	6.68%	57.3%	5.92%	6.58%	57.3%
Chevron - Rock Springs, WY	2.47%	2.75%	23.1%	2.34%	2.60%	20.5%	2.28%	2.54%	20.5%
Conserv - Nichols, FL	1.77%	1.97%	15.8%	1.68%	1.87%	14.1%	1.62%	1.80%	14.1%
Farmland Industries - Bartow, FL	1.55%	1.72%	14.9%	1.47%	1.63%	13.4%	1.45%	1.61%	13.4%
Gardinier - Riverview, FL	4.07%	4.52%	46.1%	3.85%	4.27%	40.6%	3.82%	4.25%	40.6%
IMC Fertilizer - Mulberry, FL	2.22%	2.46%	23.9%	2.16%	2.40%	22.7%	2.15%	2.39%	22.7%
Mobil Mining - Pasadena, TX	3.65%	4.06%	38.4%	3.49%	3.88%	36.0%	3.43%	3.81%	36.0%
Nu-South Industries - Pascagoula, MS	4.77%	5.31%	56.7%	4.54%	5.05%	52.2%	4.48%	4.98%	52.2%
Nu-West - Soda Springs, ID	2.61%	2.90%	26.6%	2.49%	2.76%	24.3%	2.44%	2.71%	24.3%
Occidental Chemical - White Springs, FL	1.98%	2.20%	20.5%	1.90%	2.11%	18.8%	1.88%	2.09%	18.8%
Royster - Mulberry, FL	2.47%	2.74%	24.4%	2.35%	2.61%	22.0%	2.31%	2.57%	22.0%
Royster - Palmetto, FL	6.09%	6.76%	73.6%	5.79%	6.43%	67.7%	5.73%	6.37%	67.7%
Seminole Fertilizer - Bartow, FL	2.91%	3.23%	30.0%	2.80%	3.11%	27.7%	2.77%	3.08%	27.7%
JR Simplot - Pocatello, ID	2.49%	2.76%	24.8%	2.36%	2.62%	22.3%	2.31%	2.57%	22.3%
Texasgulf - Aurora, NC	2.01%	2.24%	24.7%	1.93%	2.14%	23.0%	1.91%	2.13%	23.0%

CC/VOS = Compliance Costs as Percent of Sales
CC/VA = Compliance Costs as Percent of Value Added
IR/K = Annualized Capital Investment Requirements as Percent of Current Capital Outlays

(a) Values reported in this table are based upon EPA's compliance cost estimates. The Agency believes that these values are precise to two significant figures

Facilities evaluated here as generating potentially hazardous waste include those for which no sampling data exists

Exhibit 12-12
Significance of Regulatory Compliance Costs for Management of Phosphogypsum from Phosphoric Acid Production[a]

Facility	Subtitle C			Subtitle C-Minus			Subtitle D-Plus		
	CC/VOS	CC/VA	IR/K	CC/VOS	CC/VA	IR/K	CC/VOS	CC/VA	IR/K
Agri Chem - Bartow, FL	6.0%	6.5%	93.6%	3.4%	3.6%	62.1%	3.4%	3.7%	68.2%
Agrico Chemical - Mulberry, FL	12.6%	13.6%	239.9%	6.2%	6.9%	120.6%	3.6%	4.0%	72.4%
Agrico Chemical - Uncle Sam, LA	18.2%	20.2%	349.6%	11.9%	13.2%	224.1%	11.3%	12.6%	229.6%
Central Phosphates - Plant City, FL	32.4%	36.0%	618.2%	5.3%	5.9%	103.3%	3.1%	3.5%	63.5%
Chevron - Rock Springs, WY	5.7%	6.3%	104.9%	0.7%	0.7%	5.0%	0.3%	0.3%	1.6%
Gardinier - Riverview, FL	28.8%	32.0%	548.1%	5.3%	5.9%	101.0%	3.1%	3.5%	61.9%
Mobil Mining - Pasadena, TX	21.3%	23.7%	403.2%	5.9%	6.5%	111.2%	3.4%	3.8%	65.3%
Nu-South Industries - Pascagoula, MS	37.9%	42.1%	718.5%	7.9%	8.8%	150.8%	4.5%	5.0%	87.5%
Nu-West - Soda Springs, ID	5.8%	6.1%	102.3%	3.7%	4.1%	67.0%	3.6%	4.0%	67.0%
Occidental Chemical - White Springs, FL	4.3%	4.8%	82.8%	2.9%	3.3%	55.7%	2.9%	3.2%	55.7%
Royster - Palmetto, FL	36.4%	40.6%	690.0%	7.6%	8.4%	143.9%	4.4%	4.8%	84.5%

CC/VOS = Compliance Costs as Percent of Sales
CC/VA = Compliance Costs as Percent of Value Added
IR/K = Annualized Capital Investment Requirements as Percent of Current Capital Outlays

(a) Values reported in this table are based upon EPA's compliance cost estimates. The Agency believes that these values are precise to two significant figures.

Facilities evaluated here as generating potentially hazardous waste include those for which no sampling data exists.

use is in part discretionary, and selection of types and amounts of various fertilizer types can vary. Despite its fairly competitive position versus other world suppliers, therefore, the profit margins for phosphoric acid and phosphate rock may often be somewhat restricted.

Throughout the 1990's, domestic production of phosphoric acid is expected to remain constant, while foreign production is expected to increase by less than 2.5 percent per year. Both domestic and foreign demand for phosphoric acid are expected to grow by less than 2.5 percent per year during the 1990's.

Potential for Compliance Cost Pass-Through

Labor Markets. There has been considerable restructuring in the phosphate industry with some associated wage concessions. The potential for further labor concessions is not known.

Lower Prices to Suppliers. The ability to pass through costs to input markets is not particularly relevant because the major phosphoric acid producers are integrated.

Higher Prices. Higher prices are generally difficult to impose except during periods of worldwide prosperity. The price of phosphate rock and phosphoric acid depends a great deal on competition from Morocco, the price of alternative fertilizers, and the use of slow release fertilizers.

Evaluation of Cost/Economic Impacts

EPA believes that regulation of phosphogypsum as a hazardous waste under RCRA Subtitle C would impose potentially severe impacts on facilities at which this waste exhibits EP toxicity; the number of such facilities is highly uncertain but is at least one and likely to be two or three. Mitigation of the severe cost impacts that would be experienced by the affected phosphoric acid producers under Subtitle C would be unlikely, because of the limited potential for compliance cost pass-through (at least 10 of the 21 active domestic producers would experience no impacts), and the operational reality that a substantial quantity (approximately five tons) of phosphogypsum is generated for every ton of phosphoric acid produced using the wet process. Therefore, EPA believes that regulation of phosphogypsum as a hazardous waste could pose a threat to the continued operation of any producer whose phosphogypsum tested EP toxic. Regulation under Subtitle C-Minus would also impose significant impacts at most facilities. The prospect of regulation of phosphogypsum under the Subtitle D-Plus scenario examined here would be unlikely to pose a threat to the continued viability of the majority of the phosphoric acid facilities. For 18 of the 21 active producers, no significant impacts would be incurred in managing phosphogypsum under Subtitle D-Plus regulations. At least three facilities, however, and one in particular, would be expected to incur significant impacts in managing phosphogypsum even under Subtitle D-Plus, potentially posing a threat to the economic viability of these facilities. One of those three facilities, however, is currently planning/constructing a new stack which is expected to be lined and employ a leachate collection system; estimated costs in meeting Subtitle D-Plus requirements may therefore actually have been incurred by that facility while this report was being prepared; in that event, Subtitle D-Plus regulation would not impose any costs or impacts on this facility.

The Agency also expects that regulation of process wastewater as a hazardous waste under both Subtitle C and C-Minus regulation could potentially pose a threat to the economic viability of affected domestic phosphoric acid producers, based on estimated compliance cost impacts; estimated impacts under the Subtitle D-Plus scenario are marginally lower. Because, however, all producers are expected to be affected, there is a greater potential for passing through costs to consumers in the form of higher prices for domestically produced acid than there would be if phosphogypsum were to be regulated as a hazardous waste. Eight of the 21 facilities managing potentially hazardous process wastewaters are predicted to incur significant impacts under the Subtitle D-Plus scenario. The significance of these impacts, as discussed above, is diminished by the possibility of the operators reducing waste generation or physically separating waste streams generated from different operations, in order to dramatically reduce the actual volume of water that would be hazardous and hence require treatment.

12.7 Summary

As discussed in Chapter 2, EPA developed a step-wise process for considering the information collected in response to the RCRA §8002(p) study factors. This process has enabled the Agency to condense the information presented in the previous six sections of this chapter into three basic categories. For each special waste, these categories address the following three major topics: (1) the potential for and documented danger to human health and the environment; (2) the need for and desirability of additional regulation; and (3) the costs and impacts of potential Subtitle C regulation.

Potential and Documented Danger to Human Health and the Environment

The intrinsic hazard of phosphogypsum is moderate to high in comparison to other mineral processing wastes studied in this report. Based on EP leach test results, 2 out of 28 samples (from 1 out of 8 facilities tested) contain chromium concentrations in excess of the EP toxicity regulatory levels. Chromium concentrations measured in SPLP (EPA Method 1312) leachate, however, were well below the EP regulatory levels. Phosphogypsum contains 12 constituents that exceed one or more of the screening criteria used in this analysis by more than a factor 10. Phosphogypsum solids may also contain uranium-238 and radium-226 in concentrations that could pose an unacceptably high radiation risk if the waste is allowed to be used in an unrestricted manner. For this reason, as part of its recently promulgated airborne emission standards for radionuclides (54 FR 51654, December 15, 1989), EPA has banned the off-site use or disposal of phosphogypsum in anything other than a stack or mine, with a limited waiver for agricultural uses. (See also 55 FR 13480, April 10, 1990.)

The intrinsic hazard of phosphoric acid process wastewater is relatively high compared to other mineral processing wastes studied in this report. Measurements of pH in 42 out of 68 process wastewater samples (from 10 of 14 facilities tested) indicated that the wastewater was corrosive, sometimes with pH values as extreme as 0.5. Based on EP leach test results, 19 out of 30 samples contain cadmium concentrations in excess of the EP toxicity regulatory level. In addition, 3 of 30 samples contain chromium concentrations in excess of EP toxicity regulatory levels. Phosphoric acid process wastewater also contains four constituents at concentrations that exceed one or more of the screening criteria used in this analysis by more than a factor of 1,000 and another 15 constituents exceed at least one relevant criterion by more than a factor of 10, including three radionuclides (i.e., gross alpha and beta radiation and radium-226).

Numerous documented cases of ground-water contamination indicate that phosphogypsum and process wastewater constituents have been released to ground and surface water at a number of facilities, and, at some sites, have migrated off-site to potable drinking water wells in concentrations that are well above criteria for the protection of human health. For example, in central Florida, the State Department of Environmental Regulation has initiated enforcement actions at all 11 active phosphoric acid production facilities because phosphogypsum stacks and process wastewater ponds have caused ground-water contamination above drinking water standards at the plant boundary or beyond. Based on the evidence of documented damages, EPA concludes that management of phosphogypsum and process wastewater in stacks and unlined ponds can release contaminants to the subsurface and that stack and dike failure can release contaminants to nearby surface waters. The combination of the intrinsic hazard of these wastes and the documented evidence of releases indicates that current management of phosphogypsum and phosphoric acid process wastewater may threaten human health through drinking water exposures, threaten aquatic life, and may render water resources unsuitable for potential consumptive uses. Although EPA estimates that phosphogypsum stacks pose an MEI lifetime air pathway cancer risk of as much as $9x10^{-5}$ as a result of radon emissions from the stacks, (with minor contributions from radioactive and nonradioactive constituents in windblown dust) the Agency concluded in its analysis of NESHAPs for phosphogypsum stacks that this level of risk is "acceptable."[142] Consequently, EPA promulgated a work practice standard for radon flux from phosphogypsum stacks that the Agency "belives existing stacks meet... without the need for additional control technology."[143]

Likelihood That Existing Risks/Impacts Will Continue in the Absence of Subtitle C Regulation

At many active phosphoric acid production plants, current waste management practices and environmental conditions may allow contaminant releases and risks in the future in the absence of Subtitle C regulation. For example, the stacks and ponds are typically unlined and in the Southeast, where the phosphoric acid industry is most heavily concentrated, and ground water occurs in relatively shallow aquifers. While these surficial aquifers are not typically used for drinking water purposes, they frequently are hydraulically connected to aquifers or surface waters that supply drinking water. Similarly, catastrophic stack and dike failures and long-term seepage from stacks and ponds have released process wastewater and phosphogypsum constituents directly from management units to surface waters. Therefore, environmental releases can occur and, considering the intrinsic hazard of the wastes, significant exposures could occur if contaminated ground water is used as a source of drinking water.

The phosphoric acid production industry recently has been recovering from low production levels in the mid-1980's and may continue to expand somewhat in the future if fertilizer use continues to grow in response to increases in crop prices and planted acreage. Increases in production would likely be provided by increased capacity utilization at active plants (e.g., in 1988 three plants operated at utilization rates of 16 to 38 percent) and the reactivation of plants that are presently on standby. Therefore, if phosphoric acid production does increase, use of existing waste management units (both those at facilities evaluated in this analysis and those at idle facilities that were not included in this analysis) would expand, potentially increasing release potential and posing greater threats to human health and the environment. However, given the large quantities of these wastes, and the ban of off-site use of phosphogypsum,[144] it is unlikely that these wastes will be used or disposed in significant quantities at off-site locations in the future.

State regulation of phosphoric acid production wastes varies considerably among the seven states in which active plants are located, but requirements in most states may not be sufficient to control releases from existing units and prevent threats to human health and the environment. For example, relatively comprehensive solid waste regulations in Louisiana and Florida (under development) require liners and specify closure requirements for new and expansions of existing stacks, but the state programs provide controls for releases from existing units only through requirements for ground-water monitoring and performance standards that in some cases allow off-site contamination. In North Carolina, phosphogypsum and process wastewater are not defined as solid wastes, and are not subject to any solid waste regulations, though discharges from waste management units must be permitted under the state's EPA-approved NPDES program. In summary, state regulatory controls may not be sufficient to prevent releases of phosphogypsum and process wastewater constituents from existing units, and in only a few states are regulations that specify construction and operation standards in place or under development.

Costs and Impacts of Subtitle C Regulation

EPA has evaluated the costs and associated impacts of regulating both phosphogypsum and process wastewater from phosphoric acid production as hazardous wastes under RCRA Subtitle C. EPA's waste characterization data indicate that phosphogypsum exhibited the hazardous waste characteristic of EP toxicity at only one of the eight active facilities for which sampling data were available. EPA's data also indicate that

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[142] 54 FR 51675. December 15, 1989.

[143] Ibid.

[144] Ibid.

process wastewater is either corrosive or EP toxic or both at each facility for which sampling data were available. Because of the relatively high potential for contamination as a result of the environmental settings of most phosphoric acid sites (e.g., shallow ground water) and the large number of damage cases associated with phosphoric acid production wastes, EPA employed the conservative assumption that phosphogypsum would be EP toxic at untested facilities, and that process wastewater would be both corrosive and EP toxic at untested facilities; the Agency's cost and impact estimates reflect this assumption and therefore probably overestimate the impacts of prospective regulation.

For phosphogypsum, costs of regulatory compliance under the full Subtitle C scenario exceed $10 million annually at all affected facilities and range as high as $185 million per year; these costs would impose potentially significant economic impacts on the operators of all affected plants. Application of the more flexible Subtitle C-Minus regulatory scenario would result in compliance costs that, on average, are approximately 60 percent lower, ranging from about $1 million to more than $65 million annually. Costs under the Subtitle D-Plus scenario are approximately 19 percent lower than under Subtitle C-Minus, because of further relaxation of waste management unit design and operating standards.

Subtitle C compliance costs would comprise a significant fraction of the value of shipments of and value added by phosphoric acid production operations at most affected facilities; ratios at seven of the eleven affected facilities exceed ten percent (five have ratios at or above 20 percent), while the remaining four exceed four percent. Compliance cost ratios under the Subtitle C-Minus and Subtitle D-Plus scenarios generally range from three to eight percent, though ratios at Agrico's Uncle Sam (LA) plant exceed eleven percent even under the least stringent scenario. EPA's economic impact analysis suggests that the domestic phosphoric acid industry is currently stronger than it has been in recent years, but would probably not be able to pass through compliance costs in the form of significantly higher prices to product consumers. Moreover, because not all domestic producers would be affected or affected equally, it is improbable that facilities experiencing high compliance costs would be able to obtain higher product prices in any case, given the relatively low rate of industry capacity utilization (77 percent overall in 1988). Therefore, if phosphogypsum were removed from the Mining Waste Exclusion, facilities at which this material was EP toxic might face new waste management costs (even under modified Subtitle C standards) that could threaten their long-term profitability and hence, their economic viability.

It is worthy of note that some impacts would be likely to occur even in the absence of a decision to remove phosphogypsum from the Mining Waste Exclusion, because adequately protective waste management standards under a Subtitle D program would require the construction of new waste management units at most facilities, implying significant new capital expenditures.

Based upon existing waste characterization data, EPA believes that all of the 21 facilities generating wet process phosphoric acid process wastewater might incur costs under a change in the regulatory status of this waste. Annualized regulatory compliance costs under Subtitle C would exceed $225 million, ranging from $4.7 to $26.3 million. Annualized new capital expenditures would account for approximately 45 percent of the total, with the cost of wastewater tank treatment dominating overall costs. Under the Subtitle C-Minus and D-Plus scenarios, the annualized compliance costs drop only slightly ($10-12 million in aggregate), due to relaxed technical standards for operation of the surge ponds used to hold the wastewater prior to treatment. The Agency expects that regulation of process wastewater as a hazardous waste under both Subtitle C and C-Minus regulation could potentially pose a threat to the economic viability of affected domestic phosphoric acid producers, based on estimated compliance cost impacts; estimated impacts under the Subtitle D-Plus scenario are marginally lower. The significance of these impacts might be diminished by the possibility of the operators reducing waste generation or physically separating waste streams generated from different operations, in order to reduce the actual volume of water that would be hazardous and hence require treatment.

Finally, EPA believes that incentives for recycling or utilization of phosphoric acid production wastes would be mixed if a change in the regulatory status of this waste were to occur. The predominant management alternative to disposal of phosphogypsum has been off-site use in construction applications and in agriculture. Because of the recently promulgate NESHAP banning such use, however, EPA expects that phosphogypsum will now be disposed on-site, regardless of the RCRA requirements that may be applied to such disposal. i.e., regulation under Subtitle C would affect only the costs of phosphogypsum management, not the type(s) of management techniques employed. Direct recycling of phosphogypsum for additional product recovery is not a viable option, and process changes that might affect the chemical properties of the material as well as purification methods have been employed with variable success. It is likely that in response to new regulatory requirements, facility operators would develop and implement measures to render their phosphogypsum non-EP toxic. Process wastewater is currently internally recycled at all active facilities. The potential for reducing the amount of water used and/or significantly reducing the total quantities of corrosive or otherwise hazardous substances currently found in process wastewater is extremely limited, given the nature of wet process phosphoric acid production operations.

HYDROLOGIC IMPACTS OF PHOSPHATE GYPSUM DISPOSAL AREAS IN CENTRAL FLORIDA

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For presentation at the SME Annual Meeting
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GURR-90-292

HYDROLOGIC IMPACTS OF PHOSPHATE GYPSUM DISPOSAL AREAS IN CENTRAL FLORIDA

1.0 INTRODUCTION

Large quantities of phosphate rock are mined and processed in Central Florida (Figure 1). The phosphate rock from the mines is further processed in "chemical plants" to produce phosphoric acid (Figure 2). A by-product of the processing of the phosphate rock to produce fertilizer chemicals is an impure form of gypsum referred to as phosphogypsum. For each ton of phosphate rock processed, approximately 1.5 tons of phosphogypsum is produced (Figure 3). The typical method to dispose of this by-product gypsum is to stack it in large piles, locally referred to as gypsum stacks or gypsum fields (Figure 4).

These gypsum stacks have been the focus of many studies in recent years in an attempt to identify the potential for ground water and/or air pollution associated with the stacks. This paper attempts to discuss some of the ground water impacts and current attempts to minimize these impacts.

2.0 BACKGROUND

Initially, phosphate chemical plants produced diamonium superphosphate and waste disposal was minimal. However, since the early 1920's and 1930's when chemical plants first began to clarify and upgrade the P2O5 content of the phosphoric acid to produce triple superphosphate and diamonium phosphate, the quantities of waste gypsum to be disposed increased substantially. During this 30 to 40 year time period, vast quantities have been stored in this manner. At present there are approximately 17 gypsum stacks/fields located in the central Florida phosphate district (Figure 5). These gypsum stacks are not unique to central Florida and are located throughout the United States. Anywhere phosphoric acid is produced, one of these stacks occur. Presently there are gypsum stacks in Louisiana, Mississippi, Missouri, Texas, North Carolina and in many of the western states. A few of these gypsum stacks are inactive, but most are presently being used.

3.0 GENERAL CHARACTERISTICS

As you would expect, most gypsum disposal stacks are located as close as possible or practical to the chemical plant in order to keep pumping costs to a minimum and often are located adjacent to the mining area (Figure 6 and 7). A typical gypsum stack is 400 to 600 acres in size and has an associated cooling water pond of approximately 250 acres in size (Figure 8). The gypsum slurry is transported from the chemical plant to the top of the stack using acidic process water. The gypsum slurry is deposited on the top of the stack, the gypsum settles out and the process water is reused (Figure 9). The process water used to transport the gypsum to the top of the stack is recirculated to the plant generally via the cooling water pond. This process/cooling water is acidic, containing sulfuric and phosphoric acid from the digestion of phosphate rock with sulfuric acid.

In most cases runoff from the side slopes of the stacks is collected in ditches surrounding the perimeter of the stacks.

The process water is returned to the chemical plant for reuse in unlined ditches or pipelines (Figure 10).

Typically once the stack reaches a height of 100 to 150 feet in height, another stack is started in a new location and/or the existing one is expanded (Figures 11 and 12). However, due to difficulties in obtaining permits, some stacks recently are proposed for heights of up to 200 feet (Figure 13).

In the past these plant facilities were generally located in areas away from population centers. However, in recent years, Florida has experienced unprecedented growth and areas which were once remote and removed from population centers are now being surrounded as the suburbs extend out from the cities.

In the late 70's and 80's our environmental awareness has been increased by reported ground-water pollution. The environmental regulatory agencies have focused on gypsum stacks as a potential pollution source. As a consequence of this interest in gypsum stacks, numerous studies have been conducted in the recent past. These studies have been commissioned by various industry and regulatory interest such as the Florida Phosphate Council, Florida Institute of Phosphate Research (FIPR), the Florida Department of Environmental Regulation (FDER), the U.S. Environmental Protection Agency (EPA) and the various operating companies in pursuit of permits for construction or operation of new and existing facilities.

4.0 HYDROLOGIC SETTING IN THE CENTRAL FLORIDA AREA

The upper surficial aquifer and the floridan aquifer are the principal ground water sources in central Florida (Figure 14). In most instances these two aquifers are separated by a confining bed which may have an intermediate aquifer system. Underlying the lower Floridan aquifer is another confining bed. The upper surficial or water table aquifer is principally composed of sand, clayey sands and in some areas shell and gravel beds.

The Floridan aquifer consists principally of porous limestones. The confining units are generally sandy or silty clays, clays and marls; and/or dense limestones and dolomites or dolosilts.

The surficial aquifer is unconfined and rises or falls in response to rainfall and discharges to streams and underlying aquifers. The water level of the surficial aquifer lies below the land surface generally from about 4 to 10 feet in the area of most of the gypsum stacks.

The water in the Floridan aquifer is generally confined. Recharge to the Floridan aquifer is principally by lateral flow, leakage through confining beds and recharge in Karst regions of Florida (Figure 15). Fortunately, most gypsum stacks are located in an area of low recharge to the Floridan aquifer. The general natural flow of ground water in the central Florida phosphate district is southwestward toward the Gulf of Mexico (Figure 16). Since about 1975 the U.S. Geological Survey (USGS) has monitored and mapped the wet and dry season potentiometric level of the

Floridan aquifer. During the winter months agricultural pumpage in south central Florida can reverse the discharge flow (Figure 17).

The sandy surficial sediments which comprise the water table (surficial) aquifer are typically 5 to 50 feet in thickness (Figure 18). These surficial sediments are underlain by 20 to 80 feet of inner-bedded phosphatic, sandy, shelly, clayey, marley sediments that comprise the Pliocene Bone Valley formation. The Miocene Age Hawthorn Formation underlies the Bone Valley Formation. The Hawthorn is an impure marine dolomitic limestone which contains varying concentrations of phosphate and quartz sands, clay, marl and dolomite and ranges in thickness to upwards of 100 feet. In many areas the lower portion is an intermediate aquifer producing zone. Underlying the Hawthorn is the Miocene Tampa Formation. The Tampa is similar to the Hawthorn but contains less dolomite and has more clay beds. The Tampa ranges from a few feet in thicknesses to upwards of a 100 feet thick. Portions of the upper Tampa and lower Hawthorn formations are the principal intermediate aquifer systems. Underlying the Tampa is a thick sequence of Oligocene to Eocene aged limestones. These limestones are hundreds of feet in thickness and comprise the principal Floridan aquifer. Granular evaporites generally underlie the Floridan aquifer.

5.0 RESULTS OF PREVIOUS STUDIES

The most widely published and easily available studies for review are those which were conducted by the USGS beginning in late 1978 and published in 1984. The data were initially published in 1982 and the evaluation of the data being made available approximately 2 years later. As a result of monitoring the ground water around these stacks, FDER has noted ground water violations at many sites as noted in Table 1 and Figure 19.

Recently the USEPA has distributed a Preliminary Draft EIS Supplement to the Central Florida Phosphate area wide EIS. This preliminary draft EIS addresses gypsum disposal systems.

Most studies including the USEPA Draft EIS have indicated that the surficial ground water impacts are generally restrained to an area within 500 to 1500 feet of the gypsum stack (Figures 20, 21 and Table 2). In some cases the intermediate aquifer has been slightly impacted.

6.0 WATER CHARACTERISTICS

The processed water from the chemical plants which is used to slurry the gypsum to the disposal area is highly acidic (ph of 1.4 to 1.8) and has a high dissolved-solids concentration at about 28,000 parts per million (ppm). The predominant contaminants are sodium, phosphate, fluosilicates, hydrogen and sulfate (Table 3).

Native ground water has a dissolved-solids concentration of approximately 500 parts per million with a ph which is generally less than 7.0.

Migration of radionuclides, fluosilicates, phosphates and trace metals are easily percipitated as the acid is neutralized by the carbonate in aquifer fabrics.

Recent monitoring data for some operating plants indicates the chemical front is slowly creeping out from the field as the "carrying or absorptive properties" of the aquifer fabric is reached. As a result of the increasing chemical fronts, regulatory agency personnel are putting increasing pressure on the operators to contain/prevent the leaking of process water from the gypsum stacks.

7.0 APPROACHES TO DEAL WITH THE POTENTIAL FOR GROUND WATER CONTAMINATION IN GYPSUM DISPOSAL FIELDS

In the past, the gypsum disposal fields were constructed either on natural unmined land or in many cases they were constructed directly in the mined lands associated with the phosphate mining process. This meant that the gypsum was deposited directly upon the existing land surface or on the top of the Hawthorn Formation (Figure 22). However, during the past 10 to 15 years, several approaches have been taken to locate the stacks in areas which would alleviate the potential for ground water contamination or to construct the stacks in such a way as to reduce or eliminate the potential for ground water contamination. Initially, to protect the surface water ditches were dug around the stacks to collect the runoff and seepage from the side slopes of the stacks. This was effective to collect the surface water runoff from the gypsum disposal areas.

In the early 80's attempts were made to site stacks in areas where naturally occurring thick clays could be used as a natural liner (Figure 23). In some areas of the central Florida district, the Hawthorn Formation is very impermeable and is quite thick. In the early 80's USS Agri-Chemicals used a modification of this approach in an area where the Hawthorn was very impermeable and waste clays existed (Figure 24). In addition, a ditch was dug around the stack to prevent lateral migration of leachate (Figure 25). However the water level in the ditch had to be carefully controlled to prevent migration of contaminated ground water from the stack into the surrounding surficial aquifer.

In the mid 80's Gardinier proposed an extensive system consisting of a compacted clay liner and underdrains overlying a thick sequence (15-20') of naturally occurring Hawthorn clays in their permit application for a new gypsum stack. This was a very elaborate system of underdrains, liners, slurry walls, etc.

(Figures 26, 27 and 28). Due to the Gardinier Chemical Plant's location on the Tampa Bay and proximity to nearby population centers, these measures were required to insure that the stack would be permitted and that the ground water would be protected. More recently, IMC Fertilizer (IMCF) has proposed to construct a new gypsum disposal stack. Initially IMCF proposed more conventional stack construction techniques where the stack would be built directly upon the Hawthorn formation in a mined out area. Recently, due to increasing pressure from the regulatory agencies they have revised their plans and proposed to install a synthetic liner beneath the stack and a slurry cutoff wall along portions of the cooling water pond (Figures 29, 30 and 31). The FDER is presently considering that all new gypsum stacks constructed in Florida will require a liner to protect the ground water.

8.0 SUMMARY

In summary, recent studies have indicated that there are some potential ground water impacts associated with phosphogypsum disposal areas in Florida. Most of these studies have indicated that the lateral ground water impacts to the surficial aquifer system extend beyond the existing non-lined gypsum disposal stacks for a distance of approximately 1500 feet. In some cases contamination has been reported in the intermediate aquifer system. The various regulatory agencies including USEPA, FDER and various state and local governments have continued to increase the pressure for permit applicants to design gypsum stacks which will protect the groundwaters of the state. In the past ten (10) years gypsum stacks have been designed and sited so as to use the natural confining layers and buffering sediments which occur in Florida; designed artificial compacted clay liners and slurry walls; and more recently recommended synthetic membranes overlying the natural confining carbonate sediments to mitigate and control the leachate from gypsum disposal systems. The proposed phosphate area wide draft EIS is proposing even more stringent conditions upon siting of gypsum disposal fields and recommending closure procedures for existing stacks. The results of ground water monitoring for these newly proposed stacks once constructed will be used to determine the next generation of controls and constraints which will be applied to gypsum stack permit conditions.

TMG\GYPSUM.PPR

TABLE 1
REGULATORY STATUS OF PHOSPHOGYPSUM STACKS

FACILITY NAME	ACTIVE	INACTIVE	INTERMEDIATE OR FLORIDAN AQUIFER		SURFICIAL AQUIFER		ENFORCEMENT ACTION INITIATED	POTABLE WELLS WITHIN 1/2 MILE	EXPANSION PERMIT APPLICATION		EXTENDED ZONE OF DISCHARGE
			PRIMARY AND SECONDARY VIOLATION	SECONDARY VIOLATIONS ONLY	PRIMARY AND SECONDARY VIOLATION	SECONDARY VIOLATIONS ONLY			ISSUED	WITHDRAWN	
C.F. INDUSTRIES	X				X		X				
CENTRAL PHOSPHATES	X		X		X		X	X		X	
CONSERVE	X				X		X	X			
FARMLAND INDUSTRIES	X				X		X	X			
GARDINIER	X						X				
AGRICO CHEMICAL	X				X		X				X
AMERICAN CYNAMID		X			X						
IMC NEW WALES	X		X								
ROYSTER, PINEY POINT	X				X						
SEMINOLE FERTILIZER	X		X		X		X	X			
USSAC, BARTOW		X			X			X			
USSAC, FORT MEADE	X					X		X			
ESTECH		X			X						
IMC P-21		X				X					
ROYSTER, MULBERRY	X					X			X		

SOURCE: USEPA DRAFT CENTRAL FLORIDA PHOSPHATE AREA WIDE EIS SUPPLEMENT.

DRWG: CFRP9CHT

TABLE 2

DRINKING WATER STANDARDS: DISTANCE TO EXCEEDANCE OF LIMITATION

Constituent	Drinking Water Standards	Limitation mg/l	Approximate Exceedance Distance			
			Royster	WR Grace	Conserv	USSAC
Silver (Ag)	Primary	0.05	50[a]	100[a]	80[a]	50[a]
Arsenic (As)	Primary	0.05	200[f]	300[f]	500[b]	800[c]
Chromium (Cr)	Primary	0.05	300[b]	600[e]	1200[b]	400[f]
Cadmium (Cd)	Primary	0.01	200[f]	600[e]	850[b]	1050[c]
Lead (Pb)	Primary	0.05	50[a]	100[a]	300[e]	50[a]
Fluoride (F)	Primary	1.6	50[a]	100[a]	80[a]	---
Selenium (Se)	Primary	0.01	50[a]	100[a]	80[a]	50[a]
Iron (Fe)	Secondary	0.3	1000[f]	600[d]	580[d]	1800[e]
Sulfate (SO_4)	Secondary	250	800[f]	600[d]	580[d]	1800[e]
Total Dissolved Solid (TDS)	Secondary	500	1000[f]	600[d]	580[d]	1800[e]
Manganese (Mn)	Secondary	0.05	1100[e]	600[d]	580[d]	1800[e]

[a]Concentration below DWS within given distance

[b]Distance determined by applying linear regression to all downgradient wells

[c]Distance determined by applying linear interpolation between downgradient wells

[d]Elevated concentration above DWS at most distant monitoring well

[e]Concentration slightly above DWS and probably exceeds beyond given distance

[f]Distance estimated using water quality data and distribution of monitoring wells

---Insufficient data

Source: USEPA Draft Phosphate Areawide EIS Supplement

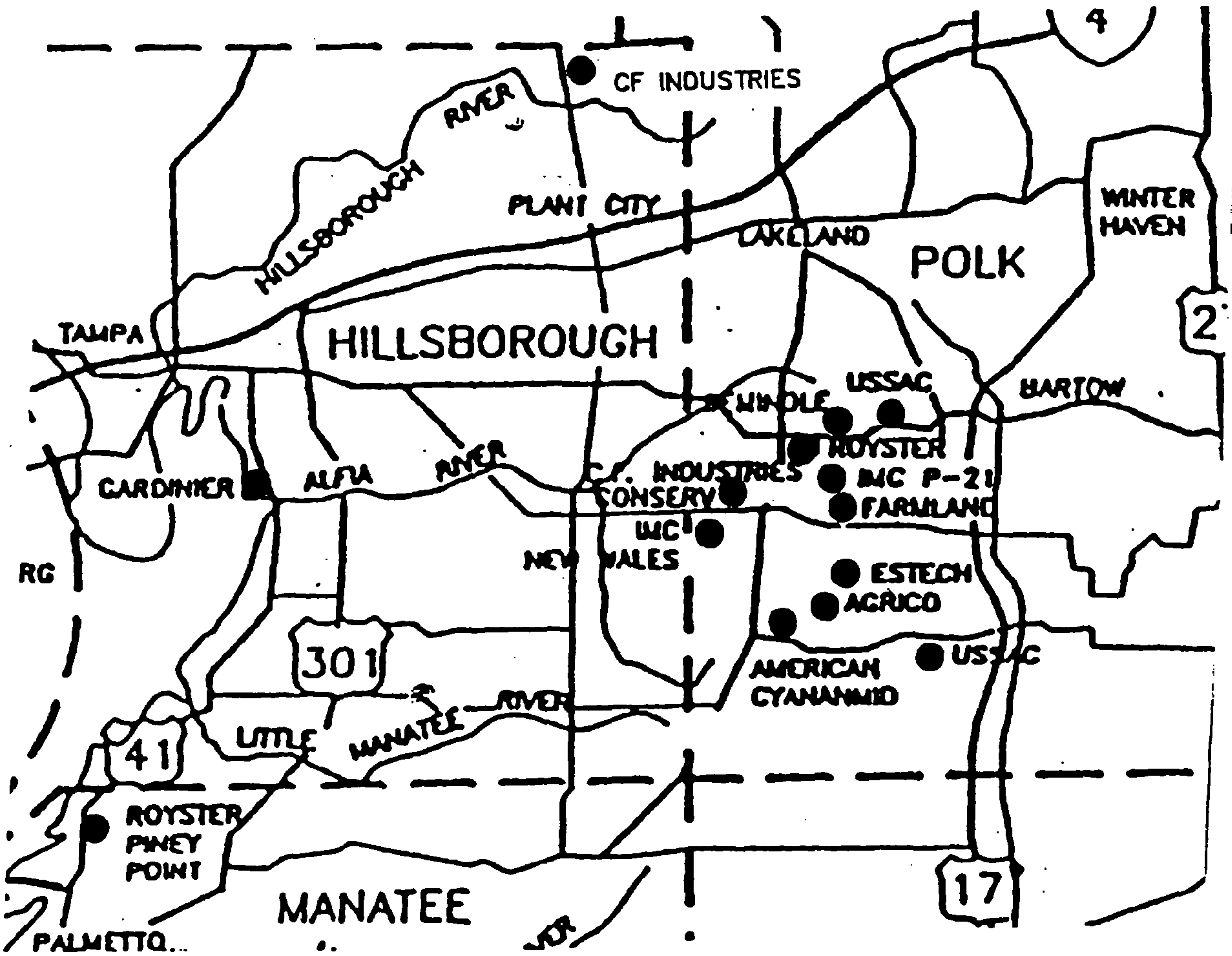
TABLE- 3

CHEMICAL AND RADIOLOGICAL COMPOSITION OF TYPICAL PHOSPHATE CHEMICAL PLANT POND WATER

	MCL	Pond Water	
• MISCELLANEOUS PARAMETERS			
Sampling Date		04-03-87	09-18-87
pH	>6.5	1.4	1.6
Specific Conductance, umhos/cm	ns	26,700	32,000
Color, cobalt units	15	1,000	x
Odor, TON	3	40	x
Turbidity, NTU	1	29.5	x
Corrosivity, Langelier Index	-0.2 to +0.2	-7.6	x
Surfactant, mg/l LAS	0.5	<0.05	x
Acidity, as $CaCO_3$	ns	40,000	36,650
Total Hardness, as $CaCO_3$	ns	3,622	x
• MAJOR CONSTITUENTS (mg/l)			
Total Dissolved Solids	500	38,350	43,293
Sulfate, SO_4	250	5,728	4,216
Fluoride, F	4.0	9,400	9,000
Orthophosphate, PO_4 as P	ns	6,500	6,900
Chloride, Cl	250	118	159
Iodide, I	ns	18.8	x
Sulfide, S	ns	0.08	x
Nitrogen			
Nitrate, NO_3 as N	10.0	<0.10	x
Organic, as N	ns	77	x
Ammonia, NH_4 as N	ns	1,421	1,108
Calcium, Ca	ns	1,248	1,076
Magnesium, Mg	ns	279	300
Potassium, K	ns	292	271
Sodium, Na	160	2,020	2,210
Silica, SiO_2	ns	4,452	5,318
• TRACE METALS (mg/l)			
Aluminum, Al	ns	228	273
Antimony, Sb	ns	1.56	x
Arsenic, As	0.05	0.12	0.33
Barium, Ba	1.0	0.6	x
Beryllium, Be	ns	0.10	x
Cadmium, Cd	0.010	0.41	x
Copper, Cu	1.0	0.28	x
Chromium, Cr	0.05	1.52	x
Cyanide, CN	ns	<0.005	x
Iron, Fe	0.3	190.3	252
Lead, Pb	0.05	0.15	x
Manganese, Mn	0.05	11.4	x
Mercury, Hg	0.002	<0.0002	x
Nickel, Ni	ns	1.40	x
Selenium, Se	0.01	0.006	x
Silver, Ag	0.05	0.06	0.06
Thallium, Tl	ns	0.63	x
Zinc, Zn	5.0	4.79	x
• ORGANIC COMPOUNDS (mg/l)			
Total Organic Carbon, TOC	ns	200	x
Phenol	ns	0.16	x
Total Trihalomethane, TTHM	0.10	<0.004	x
• RADIONUCLIDES (pCi/l)			
Gross Alpha Particle Activity	15	2,582±568	x
Radium 226	5(Combined)	67.9±10.2	x
Radium 228		2.1±0.3	x

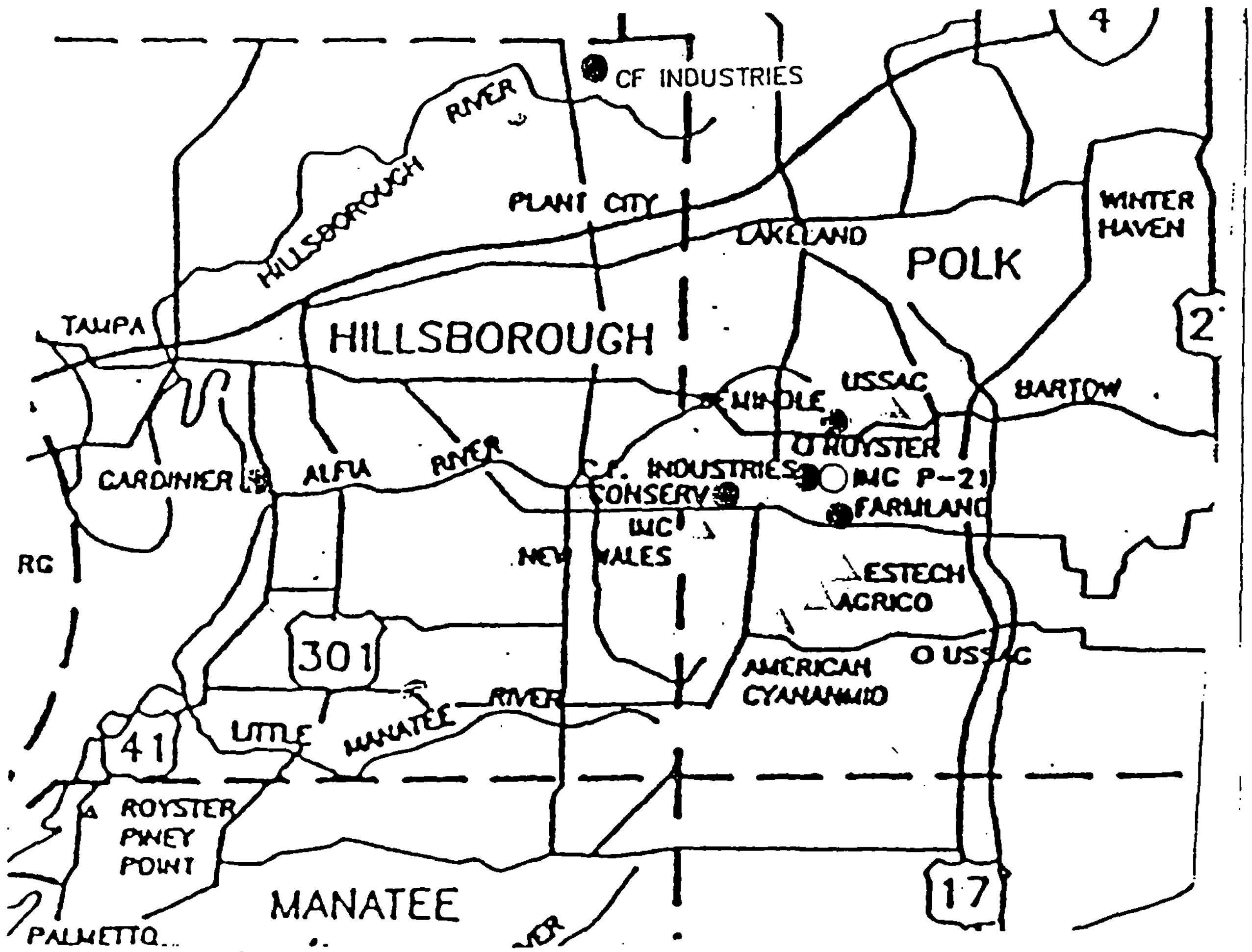
x: Parameter not measured.
ns: Not specified.
MCL: Section 17-22.210 and 17-22.220 FAC Maximum Contaminant Level.

FIGURE 5
LOCATION OF CHEMICAL PLANTS AND GYPSUM STACKS IN THE CENTRAL FLORIDA PHOSPHATE DISTRICT



DRWG: CFRPBLCP

FIGURE 19
REGULATORY STATUS OF GYPSUM STACKS IN CENTRAL FLORIDA PHOSPHATE DISTRICT



○ NO CURRENT GROUNDWATER VIOLATIONS

PRIMARY STANDARD VIOLATIONS AT THE PROPERTY BOUNDARY OR IN THE INTERMEDIATE/ FLORIDAN AQUIFER

UNDER INFORCEMENT FOR GROUNDWATER OR SURFACE WATER VIOLATIONS

DRWG: CFRP9RSG

REFERENCE # 10

KIRK-OTHMER

ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY

THIRD EDITION

VOLUME 10

FERROELECTRICS
TO
FLUORINE COMPOUNDS, ORGANIC

A WILEY-INTERSCIENCE PUBLICATION
John Wiley & Sons
NEW YORK • CHICHESTER • BRISBANE • TORONTO

Table 13. Estimated Price of 13-38-0 Ammonium Phosphate Suspension Produced in a New (1978[a]) Florida–Gulf Coast Plant

	Units/t product	Cost, \$/unit	Cost, \$/t 13-38-0
raw materials[b]			
anhydrous ammonia, t	0.145	109.45	15.87
wet-process phosphoric acid (54%), t	0.635	185.15	117.57
water, process, L	257,800	38,800	0.01
clay, t	0.014	60.00	0.84
operating costs			6.49
capital charges, 34%[c] of capital investment			6.68
sales and administrative costs, 10% of sales			16.38
Estimated price			*163.84*

[a] Plant completed February 1978 Florida–Gulf Coast area. Capacity: 720 t/d; 237,600 t/yr. Capital investment: \$4,718,000 grass roots (includes battery limits plant, 90-d product storage, site purchase and preparation, and support facilities. Working capital (30-d value of raw materials plus 90-d value of raw materials and operating costs): \$12,023,000. Courtesy of TVA.

[b] Raw materials purchased (fob Tampa).

[c] Includes insurance and taxes—3%, depreciation, 6.67%, interest—8% on one half of capital investment, and pretax return on investment—20% of capital investment.

The speed and reliability of application of suspensions by such modern equipment are unmatched by any other fertilizer application system.

Environmental Aspects of Fertilizer Production and Use

The potential for pollution of air and water is inherent in the production and use of fertilizers. Legislation to protect and preserve the environment and to protect workers in industrial plants is implemented in the United States by the EPA and the Department of Labor, respectively. There is a worldwide trend toward increased regulation of pollution (126). United States technology and regulations are taken as the principal basis for this discussion, with occasional reference to differing practices in other countries (see Air pollution; Air pollution control methods; Water pollution).

Of the six major industrial air pollutants deemed injurious to human health, three are directly involved in fertilizer manufacture: sulfur oxides (from sulfuric acid production), nitrogen oxides (from nitric acid and ammonium nitrate production), and particulates. National primary and secondary ambient air quality standards for these are shown in Table 14.

There are in addition designated or noncriteria pollutants which, although not shown to impair human health, may damage the environment. Controls for these are at various stages of development and implementation. Fluorides emitted in phosphate fertilizer manufacture have been designated and standards of performance issued in 1975 (127).

The goal of aqueous effluent guidelines is zero pollutant discharge by 1985: this was accelerated to 1977 for mixed and blend fertilizer processes and for ammonium sulfate production.

In addition to ambient air quality standards and emission standards, fertilizer manufacturers are required to control the environment in the working area in accor-

Table 14. National Primary and Secondary Ambient Air Quality Standards Affecting Fertilizer Industry

Pollutant	Primary standard[a]		Secondary standard[b]	
	Time period	Concentration, g/m^3	Time period	Concentration, g/m^3
sulfur oxides	annual average	80		
	24-h average	365		
			3-h average	
nitrogen oxides	annual average	100	same as primary	
particulate matter	annual average	75	annual average	60[c]
	24-h average	260[d]	24-h average	150[d]

[a] To protect human health.
[b] To protect human beings and the environment.
[c] Nonenforceable guideline.
[d] Not to be exceeded more than once per year.

dance with OSHA regulations. Table 15 gives OSHA standards for air contaminants associated with fertilizer manufacture.

The fertilizer industry is moving ahead on pollution control. Capital investment per year for control equipment in the United States fertilizer industry alone increased from 10.3 million dollars in 1972 to 99.7 million dollars in 1976 (126) while operating costs for pollution control for basic fertilizer producers and integrated companies more than quadrupled in that period, rising from 9.7 million dollars to an estimated 44 million dollars. Capital expenditures are expected to decline as much of the equipment to meet current air and water deadlines is now installed. The capital cost for environmental controls at fertilizer plants is 5–6% of total investment. The Fertilizer Institute estimated the operating costs of environmental control in United States fertilizer plants in 1976 to be about \$3.30/t N and P_2O_5.

Table 15. Industrial Hygiene Threshold Limit Values for Fertilizer Manufacture

Fertilizer material	Threshold limit values[a], mg/m^3 (ppm)
ammonia	35[b] (50[b])
fluoride (as F)	2.5
HF	2 (3)
H_3PO_4	1
CO	55 (50)
H_2SO_4	1
SO_2	13 (5)
HNO_3	5 (2)
NO_2	9 (5)
dusts	
silica	10
nuisance or inert, total	15
respirable	0.5
noise (8-h)	90 dB[c]

[a] 8-h time-weighted average value.
[b] Values probably will be lowered to 18 mg/m^3 and 25 ppm, respectively.
[c] Higher noise levels are permitted when exposure times are less than 8 h daily.

The technology for control of pollution at fertilizer plants is generally available, although further improvements may be expected in some areas. Under present conditions in the United States, large amounts of solid wastes—gypsum from wet-process phosphoric acid plants, sediments produced in the treatment of gypsum pond waters for discharge, and low-grade phosphate rock refuse (slimes from beneficiation plants)—must be stored. This storage of solid wastes, and the air emissions from gypsum ponds, represent the major remaining unsolved environmental problems for the industry. Under suitable economic conditions, not now existent in the United States, gypsum waste could be converted to useful products.

Pollution of groundwater and streams by fertilizer plant nutrients has caused some concern but there is strong evidence that, with caution in its use, fertilizer supplying the needed nutrients can be applied without risk of serious pollution in nearly all instances. Precautions, of course, are in order.

Air Pollution Control in Fertilizer Production. The EPA has identified fifteen major fertilizer processes as potential polluters. Standards for five categories of fluoride-emitting processes have been promulgated (127). Standards for particulate emission from phosphate rock, urea, and ammonium nitrate operations are under review and currently are under state regulation, as are those for other fertilizer process operations. Regulations as of 1977, and methods for controlling, are summarized briefly below.

Nitric Acid Plants. The allowable limit for NO_x (as NO_2) is 1.5 kg/t of HNO_3 produced (max 2-h av); opacity 10%. Methods developed for control of NO_x emissions include thermal and catalytic reduction with hydrocarbons or ammonia (see Exhaust control, industrial), reaction with urea, extended absorption, and adsorption on molecular sieves (qv). The most suitable method depends on type and size of plant and the uses to be made of the acid. All of these methods can meet or exceed EPA standards for new plants. Costs range from about 1% of production cost to net savings of \$0.15/t of acid (128).

Sulfuric Acid Plants. The allowable limit for SO_2 is 2 kg/t of H_2SO_4 produced (max 2-h av); acid mist, 0.075 kg H_2SO_4/t H_2SO_4 produced (max 2-h av); and opacity, 10%.

The most advanced control technology for sulfuric acid (qv) plants involves double contact or double absorption (DL/DA). This extended catalytic control and absorption achieves 99.7% recovery of sulfur oxides, compared to 97–98% with single absorption. Extended absorption is now standard for most new plants. Stack gas from such plants contains 200–300 ppm of SO_2. In January, 1976, a new 1814 t/d sulfur-burning DL/DA acid plant cost approximately \$16,000,000, some 10% more than a single-absorption plant.

Ammonia scrubbing is still used in some acid plants for SO_2 control. Overall economics depend on recoveries and ammonia costs. Old sulfuric and nitric acid plants are under state regulation and may be allowed somewhat higher emissions when it can be demonstrated that the concentrations of NO_2 or SO_2 in the ambient air resulting from the emission are well below the ambient standard (see Sulfur recovery).

Fluorides. Fluoride, a pollutant from several fertilizer operations, can be recovered in useful forms where the market and economic demands can be met. Whether the material is to be recovered or discharged determines the scrubbing process used for its removal. Fluorosilicic acid can be used in water fluoridation and to manufacture aluminum fluoride, synthetic cryolite, and hydrogen fluoride. The markets for these materials, however, are so uncertain that increased use of this by-product is not expected in the near-term future.

Scale formation in scrubbers for fluoride control can be a problem. For this reason spray-chamber scrubbers with little or no packing are often used. These may be either vertical or horizontal. Scrubbers tend to be more efficient than can be projected from the apparent effluent composition, the fluoride vapor pressure data available for scrubber design is apparently inapplicable.

EPA (129) estimated that costs for control of fluoride emissions under the proposed standards would be less than 1% of the 1975 wholesale price for wet-process acid, superphosphoric acid, and diammonium phosphate. Estimated costs for control of fluoride for run-of-pile triple superphosphate was about 2% of 1975 sale price, and for granular triple superphosphate, 4%.

The standards and the best methods for control of the six fluoride emitters are summarized below.

Wet-Process Phosphoric Acid Plants. No more than 10 g total fluoride per metric ton of equivalent P_2O_5 input to the process is allowed. The best demonstrated emission control consists of scrubbing offgas with gypsum pond water for removal of 98–99% of fluorides.

Gypsum ponds, devices used more extensively in the United States than elsewhere, are possibly the industry's greatest emitter of fluorides. Estimates of fluoride emitted are 0.03–0.92 kg/(hm²·d). Because there is no accepted technology for measuring or controlling fluoride emissions from the ponds, standards for these are not expected in the near future. The only way known to prevent fluoride emission from gypsum ponds is by precipitating the fluoride with lime. Liming of entire gypsum ponds is impractical.

Superphosphoric Acid Plants. No more than 5.0 g total fluoride per metric ton of equivalent P_2O_5 input to the process is allowed. In the vacuum-evaporator process the fluorides are absorbed by water in the barometric condenser and no further control device is required. For the submerged-combustion process, packed scrubbers are considered the best available system for emission reduction.

Diammonium Phosphate Plants. No more than 30 g total fluorides per metric ton of equivalent P_2O_5 input to the process for new plants is allowed. Fluorides are removed by secondary scrubbing. Best results are obtained with a spray crossflow packed-bed scrubber. The best demonstrated control for ammonia consists of scrubbing emissions with phosphoric acid solution.

Run-of-Pile Triple Superphosphate Plants. No more than 100 g of total fluoride per metric ton of equivalent P_2O_5 input is allowed. The best demonstrated control of fluoride consists of scrubbing emissions with water. No visible emission is observed from storage facilities with this type of control.

Granular Triple Superphosphate Plants. No more than 100 g of total fluoride per metric ton of P_2O_5 input to the process is allowed. The best demonstrated control consists of scrubbing offgas with water.

Granular Triple Superphosphate Storage. No more than 0.25 g/h of total fluoride per ton of equivalent P_2O_5 in storage is allowed. The best demonstrated control of fluorides consists of scrubbing emissions with water.

Phosphate Rock Processing. Although federal standards for the various operations in phosphate rock processing were still under development in 1977, states have imposed regulations (130) relating allowable emissions to the hourly tonnage of material processed.

Nearly all the phosphate rock mined contains enough moisture so that dust

Nitrogen Plant Control Technology. *Ammonia Plants.* Effluent guidelines for ammonia plants are shown in Table 16. Because condensate from ammonia plants contains 800–1100 ppm of ammonia and substantial amounts of methanol and carbon dioxide, it cannot be released to streams without treatment. Condensate is steam stripped to remove 90–95% of the ammonia to meet effluent guidelines, with the volatile contaminants discharged to the atmosphere. The trend in modern plants is toward complete abatement of air and stream pollution and reuse of condensate. Raw water treating cost would thus be reduced. Current research is directed toward this end.

Urea Plants. A 1000 t/d urea plant produces 290–375 L/min of condensate, the amount depending on type of plant. The condensate contains from 2–6% NH_3 and 0.3–0.5% urea. These contaminants can be largely removed by a combination of urea hydrolysis and ammonia stripping.

The cooling water from urea plants is too warm (43.3°C) for release into streams. Cooling towers can alleviate this problem but these are expensive. Such warm water can often be used to advantage in evaporative scrubbing operations where the heat is dissipated in evaporating water. This is done in some urea and ammonium nitrate plants.

Ammonium Nitrate Plants. Evaporative scrubbing and water handling methods in ammonium nitrate plants are similar to those used in urea plants. The possibilities for this are expanded when the ammonium nitrate or urea plants are part of a complex involving nitric acid production and neutralization and the production of both explosive and fertilizer grades of ammonium nitrate.

An ion-exchange process has been used successfully to treat waste streams ranging in solute concentration from 1,700 to 11,000 ppm (146). The process uses a classical demineralization system.

After credit is taken for recovered ammonium nitrate and demineralized water, the operating cost is $0.55–0.77/t of ammonium nitrate, ca 0.5% of the value of a metric ton of ammonium nitrate.

Potash Production. The high water solubility of most minerals encountered in potash mining sometimes leads to environmental problems in disposing of tailings and waste solutions. Mines located in arid regions, as in New Mexico, have few problems because there is little rainfall and evaporation rates are high. In areas of high rainfall, seepage from tailing piles is collected and returned to the process. Solutions are disposed of either by evaporating to dryness in the plant or in ponds, or by injection into porous underground strata (21). In the UK, tailings often are discharged into the sea.

Solid Wastes. ***Gypsum.*** In the United States and in some other countries, most of this by-product gypsum is disposed of as solid waste. A limited amount is used to treat saline soils in the western United States, mainly in California. Some is disposed of in rivers and in the ocean but this practice in the U.S. and in some other countries is being phased out for environmental reasons. Sea disposal is still permitted in Europe provided accumulation in estuaries is avoided. The most widespread practice is to stack the material near the production plant. For each daily metric ton of P_2O_5 produced, the land required for gypsum stacks is 1357 m^3 (1.1 acre-ft)/yr—27.14×10^6 m^3 (22,000 acre-ft) for a 20-yr life of a 1000 t/d (P_2O_5) plant. The urgent need to find other means for disposal or use for by-product gypsum is obvious.

A variety of processes have been developed for recovering sulfuric acid from gypsum and for using gypsum in cement production but neither practice is widespread for economic reasons.

The production of sludge by liming of gypsum pond water has already been discussed; the sludge produced is another solid waste. The sludge volume is 50–60% of the volume of pond water treated. This sludge, a mixture of complex compounds of phosphates and fluorides, is disposed of on the gypsum stacks, further compounding the problem of gypsum disposal.

Phosphate Mining and Beneficiation. Increasing water demand in Florida, falling groundwater levels, mounting water quality problems, development of shorelands, decline of esthetic quality, and disorderly developments have combined to bring about more extensive planning and reclamation legislation in Florida than in any other state. This was essential in Polk County where nearly one third of the world supply of phosphate rock was produced in 1975. In Florida, mining plans and reclamation standards must be submitted for approval by a board of commissioners before new mining activities can begin. The mining company's environmental impact statement must provide means for and guarantee of reclamation of the mineral land and must describe how the reclamation will be accomplished. Reclamation and water protection regulations are also strong in North Carolina.

There is great concern among phosphate producers in the western United States that legislation will be passed requiring all mined areas to be completely restored to their original condition. Because of the nature of the terrain in that region, such restoration would be impossible, although useful restoration is possible. The passage of such legislation could preclude use of the largest phosphate resource in the United States.

Slime ponds. The water pollution aspect of phosphate slimes has already been mentioned. The slimes, containing 3.0–3.5% solids, are put into 160–240 hm^2 ponds where the solids settle over decades. There is 20,240 hm^2 of slime ponds in Florida alone. Occasional breaking of pond dikes has caused serious pollution of streams, with extensive fish kills. Research is in progress to find ways to improve phosphate recovery and lower the impact of slime deposits on the environment (147).

Radioactivity. Solid wastes, slimes, and tailings from phosphate rock beneficiation contain small amounts of radioactivity; some slimes contain fifty times the amount of radioactivity of typical soils of the United States (148).

The radioactivity of reclaimed phosphate lands sometimes is enough to cause exposures slightly greater than the present federal guidelines for maximum exposure of uranium miners. Guidelines for disposal of such radioactive wastes have not yet been developed.

Other Solid Wastes. There are several other minor solid wastes in fertilizer production. In ammonia plants using potassium carbonate for carbon dioxide removal, a small amount of arsenic oxide (As_2O_3) sludge is produced. A 1000 t/d plant produces about 20 t/yr of sludge containing 20% As_2O_3. The sludge is either stored for special treatment in the plant or is shipped to an arsenic producer for recovery.

Sulfuric acid plants that burn sulfur produce about 0.3 kg of a sludge from filtering molten sulfur per t of H_2SO_4 produced. This sludge is usually dumped on slag piles where it sometimes ignites and results in atmospheric pollution.

Some European liquid-fertilizer producers accumulate a sludge (4–20 kg/t of liquid fertilizer) containing phosphates and fluorides together with the sawdust filter aid. Usually this is recovered and added to solid fertilizers.

Fertilizer bags containing small amounts of residual fertilizer constitute a significant waste disposal problem. These can be burned, provided they are not excessively contaminated, or they can be disposed of in land fill.

Environmental Implications of Inorganic and Organic Fertilizer Use. Surface and groundwaters receive pollutants from a wide variety of sources, including fertilizers applied to soils. With the increasing use of fertilizer, there is a tendency to regard them as a major source of pollution. The situation is complex, however, and when used properly commercial fertilizers may be only minor contributors to pollution. The subject is under intensive study in search of the facts, and means for control where needed (149–150).

According to the EPA, United States waters are improving with respect to coliform bacteria and oxygen demand, but the concentrations of nitrogen and phosphorus are increasing, largely from agricultural runoff and sewage. Most United States surface waters contain at least 0.3 ppm of N and 10 ppb of P. In terms of the level of nutrients required for control of algae growth (<0.3 ppm of nitrogen and <10 ppb of phosphorus), most United States surface waters are polluted, the concentration of nitrogen and phosphorus nearly always exceeds these amounts. Rainwater contains on the average 0.7–1 ppm of nitrogen.

Fertilizer nitrogen is removed from soil by plants, surface runoff, leaching and erosion. The main factors involved in phosphorus removal are crop uptake and erosion; leaching is significant only in highly siliceous sands and organic soils.

High values of NO_3–N in drinking water may cause methemoglobinemia in very young infants but the critical level is not well defined. The United States federal standard is 10 ppm but the California standard is 20 ppm. Animals too may be adversely affected by excessive concentrations of NO_3–N in drinking water.

It should be noted that surface and groundwater receive plant nutrients from many sources other than the fertilizer used in agriculture. Other major sources from agriculture include decaying plant matter, soil erosion (ca 3×10^9 t of sediment/yr in the United States carrying ca 1.8×10^6 of total phosphorus), animal and other livestock wastes. Manufactured fertilizer usually is not the major source of nutrients. For example, some 90×10^6 t/yr of nitrogen worldwide is fixed by biological and other natural means (151), compared to about 42×10^6 t of N in manufactured fertilizer used in 1975.

Storage and soil disposal of animal and poultry wastes and disposal of municipal sewage are very serious sources of pollution and are receiving major efforts toward control.

Nitrogen. Ammonium nitrogen from whatever source (anhydrous ammonia, inorganic salts, urea, controlled-release fertilizers, animal waste) can be volatilized when applied to the surface of soils. When incorporated in the soil, it is not readily leachable, since it is held by ion exchange as are other cations. In most agricultural soils, however, ammonium–N is usually converted to nitrate–N in a few weeks when soil is suitable for crop growth. Although the rate of this conversion is variable with source, level of aerobic activity, temperature, and other soil conditions, most ammonium fertilizer is converted to nitrate in the soil. For flooded rice culture, conditions are different, and ammonium–N persists.

Nitrates are water soluble, leachable, penetrate soil to considerable depths and can result in high accumulations, or loss to groundwater in uncropped soil. Generally, however, nitrate does not accumulate under native grasslands because during much of the crop year it is utilized by the crop (150). Nitrate added as fertilizer or produced in the soil while plants are not growing may be leached below the root zone where it will either accumulate or move into groundwater. In high rainfall areas, the latter is very likely.

Water moves downward in soils when precipitation or irrigation exceeds loss of water by evapotranspiration. Nitrate may also move downward in the absence of a growing crop, and hence leaching is most likely to occur in late fall, winter, and early spring. Situations most conducive to loss of nitrogen from runoff and erosion occur when high rates of nitrogen are applied on sloping lands (an unlikely occurrence as such lands are usually in pasture) subject to intensive rainfall, when heavy rainfall occurs immediately following surface application of fertilizer, when fields are inadequately protected by plant cover, or when soils have low rates of infiltration.

Despite their limitation as analytical tools, runoff plots can yield data to illustrate the importance of crop cover, and also to compare treatments (152). Comparison of nutrient losses from fertilized and unfertilized plots in a small watershed shows no appreciable differences in nutrient content of runoff (153). Additions of N, P, K, and S in precipitation exceeded the losses in surface runoff and groundwater flow. Additions of these nutrients to surface waters by precipitation is often sufficient to promote algal growth.

Animal wastes and sewage sludges applied to the surface of the land as fertilizers, or stored on the surface, can yield runoff hazardous to surface waters. When placed on soil, manures and sludges should be incorporated as soon as possible to prevent groundwater pollution through runoff. Leaching of N from these organic materials can be a serious problem.

Degradation of ground water with soluble salts and nitrate from animal waste and sewage sludges is one of the factors limiting their use on the land. The pollution of groundwater by the nitrate and soluble salts will be most serious where the amounts of nitrate greatly exceed the needs of the crop, an increasingly serious problem in the area of large feedlots. Cattle in a 60,000-animal capacity feedlot excrete approximately 10^6 t of manure containing about 4000 t N annually within an area of 150 hm^2. Accumulation and storage of the waste can present serious problems of air and water pollution. To spread this amount of manure on the land at the rate of 23 t/hm^2, not an uncommon rate, requires 4000 hm^2, an area not usually accessible to most feedlots. Such large amounts of waste applied to the soil contain N far in excess of crop needs. Development of safe handling and use of this waste is receiving extensive study.

One main factor limiting the long-range use of sewage sludge on agricultural land is the potential hazard associated with the presence of certain heavy metals sometimes introduced by industrial effluents. The elements of greatest concern are zinc, copper, nickel, and cadmium. These elements, which are toxic to animals and man at high levels, are taken up by plants. Since they accumulate in the soil, the fear is that long-term heavy use of sewage sludge on soil will lead to hazardous amounts. Wide dispersion of sewage sludge, as by combining it at appropriate levels with commercial fertilizers, may be useful in this regard. Long-term experiments needed to evaluate the delayed effects are in progress. Economic factors also have limited the large-scale use of sewage sludge as fertilizer.

The loss of nitrogen and nitrogen oxides (mostly N_2O) from soil was mentioned earlier. Concern has arisen about the role of N_2O in depleting the ozone layer in the stratosphere. Important aspects of this phenomenon are yet to be clarified—the extent to which N_2O actually destroys the ozone, what fraction of fertilizer nitrogen undergoes denitrification to produce N_2O, how long N_2O remains in the atmosphere, and whether the oceans contribute most of the N_2O found in the atmosphere. Estimates of the extent of destruction of the ozone layer by N_2O have varied widely (154) (see Air pollution; Ozone).

The best hope of unraveling the complexities of the fate of fertilizer nitrogen in soil lies with research in progress using fertilizers labeled with ^{15}N-depleted nitrogen. Using this tool, scientists at TVA's National Fertilizer Development Center in cooperation with Los Alamos Scientific Laboratory, USDA, and university scientists across the United States are conducting field studies of the fate of fertilizer nitrogen in a variety of soils, climates, and types of agriculture (155). The method offers promise of leading to improved efficiency in use of fertilizer nitrogen and protecting the environment.

Phosphate. Phosphorus behaves entirely differently than nitrogen in soils, since it is strongly retained by most soils except siliceous sands and organic soils. The quantities of fertilizer P transported to surface and groundwaters is very difficult to determine under field conditions. However, many research reports show losses of P in solution to be about 1 kg(hm^2·yr). The situation is confused by the fact that the concentration of phosphorus in drainage waters is directly related to the phosphorus content of the rocks from which a soil is formed; the phosphorus content of rivers in high phosphatic limestone areas may range up to 0.22 ppm whereas those in sandstone and shale areas may contain only a trace. Moreover, whether soil is unfertilized or heavily fertilized, the concentration of phosphorus in the soil solution is usually within one order of magnitude of 0.1 ppm. Streams draining the most intensively cultivated watersheds carried concentrations of phosphorus below 0.03 ppm and the general levels were unchanged between 1921 and 1972 despite an eight- to tenfold increase in phosphorus fertilization (156).

Water-soluble phosphorus applied to fine-textured mineral soils is rapidly converted to solids only sparingly soluble in water. Generally, therefore, phosphorus is not leached from these soils. There is little question, however, that downward movement of P in highly siliceous sands may constitute a pollution hazard in localized areas. Similarly, organic colloids have little capacity to absorb P because of their low concentrations of Fe, Al, and Ca. This is important in choosing soluble or water-insoluble phosphate sources for organic forest soils.

The chemistry of soil phosphorus is different in flooded soils. Ferrous phosphate, a compound more soluble than the ferric phosphates of nonflooded soils, is formed. Moreover, the pH is increased and free iron oxide coatings are reduced, resulting in the release of occluded phosphate. These reactions occur and are important in paddy rice culture.

Sediment from soil erosion and other sources carries about 1.8×10^6 t of total phosphorus into United States surface waters annually (157). This sediment acts as a scavenger for dissolved phosphorus in streams, absorbing phosphorus from solutions containing more than 0.01 ppm. A practical consequence of this is that concentrations of 0.10–0.13 ppm of soluble phosphorus in runoff water from fertilized fields may be reduced to 0.009 ppm by adsorption on suspended sediment, a mechanism with large capacity for keeping phosphorus in natural waters near or below environmentally acceptable levels (156).

Reduction of runoff phosphorus in problem areas such as soils of high phosphate status, animal feedlots, and in urban runoff can be more readily achieved by water management to reduce runoff and erosion rather than by chemical treatment to remove phosphorus from the water. Farm management practices, thus, are of major importance for control of runoff and erosion. Schuman and co-workers (158) reported that the combined dissolved and sediment phosphorus lost from contour-plowed corn was nearly ten times higher than those losses from level-terraced corn when the two were fertilized at the same rate. Phosphorus losses from brome-grass pasture were substantially below those from contour-plowed corn fertilized at the same level.

In general, the trends for phosphorus pollution from animal wastes parallel those for nitrogen. Storage and application practices are crucial. Fall application of manure on alfalfa gave the highest losses, whereas fall application to fall-plowed cornfields gave much smaller losses (159).

Perspective and Corrective Measures. The production and use of fertilizers are vital for adequate production of food and fiber for human needs. To continue to meet these needs will require further increase in use of fertilizer. Although the impact on the environment of fertilizer nutrient losses from agricultural soils is difficult to quantify, losses to surface and groundwater do occur, erosion losses probably exceeding those of solution. It is not unusual to find that the combined pollutants from nonhuman sources and domestic sewage far exceed those from farming. Moreover, the farming inputs are only partially owing to use of commercial fertilizer. As important as control of soil erosion is for reducing losses of biologically active phosphorus to streams, on a national (U.S.) basis the effect of reducing soil erosion is small compared to the reduction that would result from tertiary treatment of municipal sewage.

USDA and EPA evaluated control of pollution from cropland (160) and listed the following practices for control of nutrient loss from agricultural applications: elimination of excessive fertilization; proper timing of nitrogen application; using crop rotations; using animal wastes for fertilizer; plowing under green manure crops; using winter cover crops; controlling fertilizer release; incorporating surface applications; controlling surface applications; using legumes in haylands and pasture; and timing fertilizer plow-down.

Energy Requirements for the Production and Distribution of Chemical Fertilizers in the United States

Production and distribution of fertilizers in the United States consumed only about 0.7% of the total national energy consumption at the 1976 level of production. The total national energy consumption of fertilizers in the United States agricultural system from extraction of raw materials to the application of fertilizer to the soil is about 5.67×10^8 GJ (538×10^{12} Btu), according to Davis and Blouin (161). About 88% of the total is for production, 1% is for transportation of raw materials, and 11% is for transportation, storage, handling, and application of the fertilizer. Energy requirements for production of the fertilizers are summarized in Table 18.

The estimated energy for raw material and product transportation is 38.5×10^6 GJ (36.5×10^{12} Btu), that for field application is 9.92×10^6 GJ (9.41×10^{12} Btu), and that for storage and transfer is 22.79×10^6 GJ (21.62×10^{12} Btu).

Although the energy consumed in fertilizer production and use is a very small percentage of total national energy consumption, the shortage of energy and its high cost make it a matter of concern, and serious efforts by the industry toward lowering energy consumption are underway. According to a recent report of The Fertilizer Institute (162), the average energy consumption per unit of fertilizer produced was reduced by 12% over the period 1972–1977.

REFERENCE # 11

KIRK-OTHMER

ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY

THIRD EDITION

VOLUME 17

PEROXIDES AND PEROXY COMPOUNDS, INORGANIC
TO
PIPING SYSTEMS

1807 175 YEARS OF PUBLISHING 1982

A WILEY-INTERSCIENCE PUBLICATION
John Wiley & Sons
NEW YORK • CHICHESTER • BRISBANE • TORONTO • SINGAPORE

direct methods of flame spectroscopy are used for low concentrations of phosphorus. Fluorometry, spark-source mass spectroscopy, infrared spectroscopy, electron spectroscopy, and nuclear magnetic resonance spectroscopy have also been employed (see Analytical methods).

Environmental Considerations

Inorganic phosphates present no hazard to humans and are essential to life processes. However, phosphorus creates environmental problems, mainly because its availability increases the growth of algae in many lakes. In recent years, considerable controversy has centered upon the contribution of phosphate-built detergents to excessive algae growth and subsequent eutrophication of natural receiving waters. Minnesota, Wisconsin, Michigan, Indiana, New York, Vermont, and Akron, Ohio, Chicago, Ill., and Dade Co., Fla., have legislated against the use of phosphorus in detergents, resulting in a patchwork of restrictions. No two sets of regulations are exactly alike; some restrict only home laundry detergents, others cover a range of household and commercial cleaning products.

Problems apparently caused by sewage-borne phosphates are mostly localized to areas that have traditionally employed lakes as receiving waters for sewage effluents. Average phosphorus concentrations vary in municipal sewage for several reasons, including industrial waste input, storm waters, seasonal fluctuations, and daily living-habit cycles. Extreme values range between 3 and 15 mg/L (typical 5–9). The chemical form of phosphorus in waste varies, including soluble orthophosphates, condensed phosphates, insoluble salts, and numerous forms of organic phosphorus. Activated-sludge treatment considerably reduces the condensed phosphates to orthophosphates. Thus, the principal inorganic phosphorus input to receiving waters via sewage effluent is orthophosphate. It is believed that much of this is precipitated as inactive phosphorus, which is trapped in sediments where it is ultimately converted to an apatite.

The growth of algal nuisance blooms is complex and appears to involve a symbiotic relationship between algae and bacteria. Sewage effluent, treated or raw, provides an excellent growth medium for both organisms. There is little doubt that phosphorus is one of the nutrients supplied. It is open to question, however, as to whether a banning of phosphate detergents and cleaners sufficiently reduces phosphorus input to the very low levels needed to control algal growth when, in fact, natural wastes and fertilizers provide most of the phosphorus input to receiving waters. A more logical, but more costly, approach is phosphorus removal during sewage treatment.

Investigation of the effects of phosphorus on the environment is in its initial stage; the issue is further complicated by the lack of an adequate data base. Mankind cannot prohibit phosphorus, as it is an essential part of the natural order of the world. However, it has to be controlled when necessary. The simplistic approach of legislating detergent phosphates, although helpful in some isolated cases, does not accomplish this goal. An excellent review of this area is available (10).

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No city found ! press RETURN to try again.

REFERENCE # 12

COVERAGE

STATE	COUNTY	STATE NAME	COUNTY NAME
12	57	Florida	Hillsborough Co
12	81	Florida	Manatee Co
12	103	Florida	Pinellas Co

CENTER POINT AT STATE : 12 Florida
COUNTY : 81 Manatee Co

Press RETURN key to continue...

REGION OF THE COUNTRY

Zipcode found: 33591 at a distance of 6.6 Km

STATE	CITY NAME	FIPSCODE	LATITUDE	LONGITUDE
FL	TERRA CEIA	12081	27.5767	82.5733

Press RETURN key to continue ...

CENSUS DATA

AMAX Phosphate
LATITUDE 27:37:24 LONGITUDE 82:31:54 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	0	0	0	0	0
S 2	0	0	0	0	0	0	0
S 3	0	0	0	172	0	0	172
S 4	0	0	0	0	185	0	185
S 5	0	0	0	435	36	2221	2692
S 6	0	0	0	0	0	445	445
S 7	0	0	0	72	0	0	72
S 8	0	0	0	0	0	0	0
RING TOTALS	0	0	0	679	221	2666	3566

Press RETURN key to continue ...

REFERENCE # 13

"Rite in the Rain"
WEATHERPROOF

LEVEL

NOTEBOOK NO. 311

E4-2583

AMAX Phosphate

TDD: F4-9009-01

Palmetto, Manatee County,
Florida

P.M.: Maureen Gordon

LOGBOOK REQUIREMENTS
REVISED - NOVEMBER 29, 1988

NOTE: ALL LANGUAGE SHOULD BE FACTUAL AND OBJECTIVE

1. Record on front cover of the Logbook: TDD No., Site Name, Site Location, Project Manager.
2. All entries are made using ink. Draw a single line through errors. Initial and date corrections.
3. Statement of Work Plan, Study Plan, and Safety Plan discussion and distribution to field team with team members' signatures.
4. Record weather conditions and general site information.
5. Sign and date each page. Project Manager is to review and sign off on each logbook daily.
6. Document all calibration and pre-operational checks of equipment. Provide serial numbers of equipment used onsite.
7. Provide reference to Sampling Field Sheets for detailed sampling information.
8. Describe sampling locations <u>in detail</u> and document all changes from project planning documents.
9. Provide a site sketch with sample locations and photo locations.
10. Maintain photo log by completing the stamped information at the end of the logbook.
11. If no site representative is on hand to accept the receipt for samples, an entry to that effect must be placed in the logbook.
12. Record I.D. numbers of COC and receipt for sample forms used. Also record numbers of destroyed documents.
13. Complete SMO information in the space provided.

Addition of F4-2582

10/16/90

Well Code Location	Top of Casing Depth	Diameter	Top Casing to Water Level	Volume	To grd	Time
AP-MW-01	15.15	4"	5.1'		2.1'	1100
No Readings on OVA @ well AP-MW-01						
AP-MW-07	15.20	4"	5.20'	6.5 (19.5)	1.35'	13.50
No Readings on OVA @ well AP-MW-07						
AP-MW-02 / AP-MW-05	Tops off — Cancelled					
AP-MW-04	22.6'	2"	6.45'	(7.8) 8 gal	2.45'	1520
No OVA readings						
AP-MW-06	65.5'	2"	6.10'	20 gal	1.82'	
Grass in area is dead, w side			gypsum drainage ditch			1615
No readings OVA, M4 - 0.04 mR/hr						
Area and water smells			Intermediate aquifer			
like S — from reducing						
bacteria $(SO_4^{-2} \rightarrow S^{-2})$						
10/17/90						
AP-MW-03	21.15'	4"	5.25'	8 gal	1.60'	900
No reading HNu, M-4 0.06 mR/hr						

M. Lindo

M. Lindo

5

4a 10/17/90
since the facility uses
county water there
is no permitted well
for dw.
There is a small
house on the plant's
property which they
will Buy as of
Nov. 1, 1990. Occupant
is gone, phone disconnected
∴ PW on east side
on Buckeye Rd will
be only one
There are 4 trailers
~50' SE of plant on
same side of street —
neighbors or adjacent
property is on wells.
Agric. - orange, tomatoes
truck

M. E.

10/17/90
Phosphoric Products
Piney Point

1-800-238-5355
34221

Bradenton
231 US 301 Blvd East

Open until 6:30 MW

South 41 Tk, 301/41
301 past Desoto Mall
(2 to 3 miles on left)
Bear left on 301
Manatee Memorial - 1 mile
past
Middle School on left
Flea Market
Took - Talk right 301
Gvoc

M. Dassler

11

8 10/17/90

Code	Location	Comments	Time
AP-SS-03	West of DAP pond. Between ditch & pond SE and E across pond acc. gypsum stack Ditch - seepage	Pond elevated 8' above Prop to ditch 8' Dark brown, sandy, Some white (gypsum?)	1020
AP-SB-03	From gypsum stack M-4 - likely -	Looks as if going through gypsum	1030
		Hit rock Move across ditch	1041
AP-SD-10	DAP pond by inlet for DAP	Dark gray granular	
AP-SB-03	Across drainage ditch - West side 7.5	Taken 1/2" leaves 7.5-8.0' b/s	1135
AP-TW-03		10' bls Dark brown water in ditch	1145
AP-SS-07	On top of gypsum stack. East of DAP pond.	Gypsum. Newly deposited	1150

M [illegible]

M [illegible]

10 10/11/90 | | 10/11/90 | 11

Code	Location	Comment	Time
AP-SS-06	Between seepage ditch and cooling pond. By MW-06 20' North	Sprayers on stack in area. No HNu response	1200
AP-SB-06	" "	4" b/ S. Brown sandy soil	1215
AP-SD-12	Drainage ditch W of gypsum stacks by MW-06	Dark brown water. Brown sandy SD.	1230
AP-~~SD~~ SW-06	downgradient side of outfall #002	lots of minnows	1440
AP-SD-06	" "	Brown sand with some shells	1445
AP-SW-07	Drainage ditch 002 20' upgradient of Hiway 41	lots of minnows	1515
AP-SD07	Charcoal Grey sand with some shell pieces	drainage ditch 002 20' upgradient of [illegible]	1520

M. Sorlo | M. Sorlo

10/11/90

Code	Location
AP-SW-08	Piney Point Creek 20' North of County Line Road
AP-SD-08	" "

M. Coster

10/11/90

Comment	Time
	1605
Light Brown	1610

M. Coster

Reference No. 14

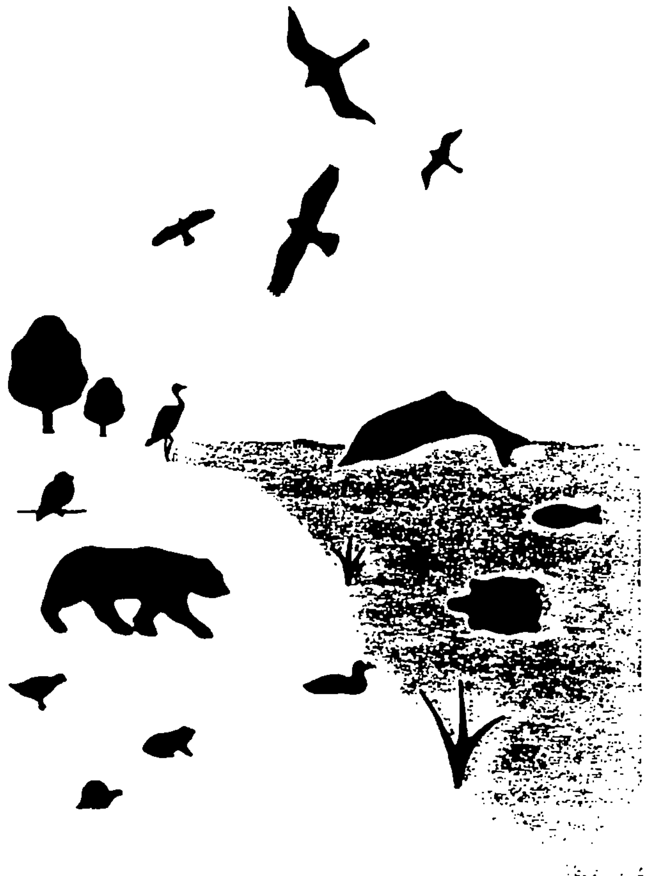
St Petersburg

3

FLORIDA

1:250 000-scale map of

Gulf Coast
Ecological Inventory



Produced by
U. S. FISH AND WILDLIFE SERVICE
1982

114 Star drum

116 Southern kingfish
117 Northern kingfish
118 Gulf kingfish
119 Sheepshead
120 Southern flounder
121 Blue catfish
122 White catfish
123 Channel catfish
124 Yellow bullhead
125 Brown bullhead
126 White crappie
127 Black crappie
128 Largemouth bass
129 Spotted bass
130 Green sunfish
131 Longear sunfish
132 Warmouth
133 Bluegill
134 Redear sunfish
135 Striped mullet
136 Red snapper
137 Florida pompano
138 Bluefish
139 Cobia
140 Atlantic spadefish
141 Little tunny
142 Spanish mackerel
143 King mackerel
144 Sea catfish
145 Gulf menhaden
146 Bay anchovy
147 Gars
148 Buffalos
149 Freshwater drum
150 Bowfin
151 Carp
152 Key silverside (S)
153 Tarpon
154 Ladyfish
155 Permit
156 Bonefish
157 Cero
158 Mutton snapper
159 Yellowtail snapper
160 Red grouper
161 Gray snapper
162 Grunts
163 Atlantic bonito
164 Sailfish
165 Vermilion snapper
166 Warsaw grouper
167 Tilefish
168 Great barracuda
169 Dolphin
170 Jewfish
171 Snook
172 Tripletail
173 Lane snapper
174 Nassau grouper
175 Black grouper
176 Gag
177 White grunt
178 Greater amberjack
179 Pinfish
180 Pigfish
181 Wrasses
182 Parrotfish
183 Damselfish
184 Butterflyfish
185 Surgeonfish
186 Swordfish
187 Blue marlin
188 White marlin
189 Skipjack tuna
190 Blackfin tuna
191 White mullet
192 Crevalle jack
193 Florida gar
194 Gizzard shad
195 Sunshine bass
196 Silver perch
197 Sea bass
198 Yellowmouth grouper
199 Striped mojarra
200 Gulf flounder
201 Cardinalfish
202 Angelfish

(continued)

Produced by
U. S. FISH AND WILDLIFE SERVICE
1982

AQUATIC ORGANISMS (continued)

SYMBOL SPECIES

FISH (100-299)

203 Blue runner
204 Atlantic thread herring
205 Chain pickerel
206 Rivulus
207 *Key blenny*
208 Striped bass
209 Atlantic sturgeon (S)
210 Suwannee bass
211 Redbreast sunfish
212 Spotted sunfish
213 Flier
214 Redfin pickerel
215 *Red porgy*
216 Alabama shad
217 Skipjack herring
218 Spanish sardine
219 Bluestripe shiner (S)
220 Shoal bass
221 Blackmouth shiner (S)
222 Saltmarsh topminnow
223 *Crystal darter* (S)
224 Harlequin darter
225 Okaloosa darter (F)
226 Flathead catfish
227 White bass
228 Yellow bass
229 Alligator gar
230 Blue sucker
231 *Frecklebelly madtom* (S)
232 Rock bass
233 Gafftopsail catfish
234 Silver seatrout
235 Bluenose shiner
236 River redhorse
237 Freckled darter
238 Bluntnose minnow
239 Bluntface shiner
240 Rainbow darter
241 Paddlefish (S)
242 Triggerfish
243 Squirrelfish
244 River darter (S)
245 Rio Grande cichlid
246 Silk snapper

(continued)

AQUATIC ORGANISMS (continued)

SYMBOL SPECIES

FISH (100-299)

247 Hinds
248 Yellowfin grouper
249 Scamp
250 Yellowedge grouper
251 *Palometa*
252 Yellow jack
253 Bar jack
254 Horse-eye jack
255 Hogfish
256 Dwarf seahorse

REPTILES AND AMPHIBIANS (300-349)

300 *Green sea turtle* (F)
301 Loggerhead sea turtle (F)
302 Hawksbill sea turtle (F)
303 Kemp's Ridley sea turtle (F)
304 Leatherback sea turtle (F)

MAMMALS (350-399)

350 West Indian manatee (F)
351 *Atlantic bottlenose dolphin*
352 Atlantic spotted dolphin
353 Finback whale (F)
354 Sperm whale (F)
355 Right whale (F)
356 Short-finned pilot whale
357 False killer whale
358 Pygmy sperm whale
359 *Minke whale*
360 Striped dolphin
361 Killer whale

High salinity estuarine habitat (generally greater than 20 parts per thousand); arrows used for wide estuaries.

or

Middle salinity estuarine habitat (generally 5 to 20 parts per thousand).

Low salinity estuarine habitat (generally 0.5 to 5 parts per thousand) and tidal fresh water.

Non-tidal freshwater riverine and creek habitat.

Species composition changes where denoted by an asterisk.

TERRESTRIAL ORGANISMS

Shown in BROWN: species with special status shown in RED-(F) or (S) indicates species protected by Federal or state legislation; all Latin names given in text.

SYMBOL SPECIES

PLANTS (400-499)

400 Lance-leaved wake-robin (S)
401 Florida royal palm (S)
402 Orchids (S)
403 Bromeliads (S)
404 Royal palm-bald cypress forest
405 Ferns (S)
406 Cacti (S)
407 Lignum vitae (S)
408 Palms (S)
409 Chapman's rhododendron (F)
410 Hollies (S)
411 Peppers (S)
412 Coonties (S)
413 Four-petal pawpaw (S)
414 Sandhill milkweed (S)
415 Sea lavender (S)
416 Catopsis (S)
417 Giant dewflower (S)
418 [illegible] (S)

TERRESTRIAL ORGANISMS (continued)

SYMBOL SPECIES

WADING BIRDS (600-649)

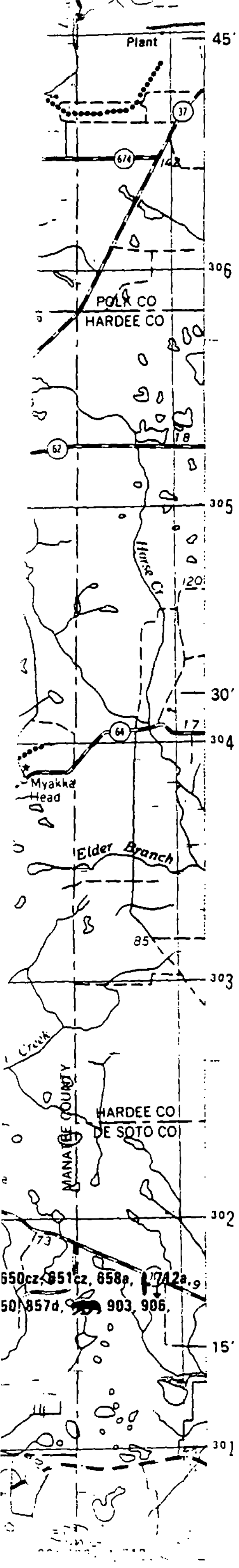
604 Great blue heron
605 Reddish egret (S)
606 White-faced ibis (S)
607 White ibis
608 Roseate spoonbill
609 Great egret
610 Snowy egret
611 Louisiana heron
612 Black-crowned night heron
613 Little blue heron
614 Cattle egret
615 Ibises
616 Yellow-crowned night heron
617 Rails
618 Least bittern
619 Gallinules
620 Florida sandhill crane (S)
621 Great white heron
622 American bittern
623 Limpkin
624 Mississippi sandhill crane (F)
625 Whooping crane (F)
[illegible] Least grebe

TERRESTRIAL ORGANISMS (continued)

SYMBOL SPECIES

SONGBIRDS AND OTHERS (800-849)

823 Florida scrub jay (S)
824 Yellow-rumped warbler
825 *Ringed turtle dove*
826 Bachman's sparrow
827 Hooded warbler
828 Brown-headed nuthatch
829 Perching birds
830 Groove-billed ani
831 Yellow-headed blackbird
832 Warblers
833 Goatsuckers
834 Fringillids
835 Louisiana waterthrush
836 Sprague's pipit
837 Stoddard's yellow-throated warbler
838 Mourning dove
839 Ring-necked pheasant
840 Pauraque
841 Rio Grande turkey
842 Chachalaca
843 Kiskadee flycatcher
844 [illegible]



116 Southern kingfish
117 Northern kingfish
118 Gulf kingfish
119 Sheepshead
120 Southern flounder
121 Blue catfish
122 White catfish
123 Channel catfish
124 Yellow bullhead
125 Brown bullhead
126 White crappie
127 Black crappie
128 Largemouth bass
129 Spotted bass
130 Green sunfish
131 *Longear sunfish*
132 Warmouth
133 Bluegill
134 Redear sunfish
135 Striped mullet
136 Red snapper
137 Florida pompano
138 Bluefish
139 Cobia
140 Atlantic spadefish
141 Little tunny
142 Spanish mackerel
143 King mackerel
144 Sea catfish
145 Gulf menhaden
146 Bay anchovy
147 Gars
148 Buffalos
149 Freshwater drum
150 Bowfin
151 Carp
152 Key silverside (S)
153 Tarpon
154 Ladyfish
155 Permit
156 Bonefish
157 Cero
158 Mutton snapper
159 Yellowtail snapper
160 Red grouper
161 Gray snapper
162 Grunts
163 Atlantic bonito
164 Sailfish
165 *Vermilion snapper*
166 Warsaw grouper
167 Tilefish
168 Great barracuda
169 Dolphin
170 Jewfish
171 Snook
172 *Tripletail*
173 Lane snapper
174 Nassau grouper
175 Black grouper
176 Gag
177 White grunt
178 Greater amberjack
179 Pinfish
180 Pigfish
181 Wrasses
182 Parrotfish
183 Damselfish
184 Butterflyfish
185 Surgeonfish
186 Swordfish
187 Blue marlin
188 White marlin
189 Skipjack tuna
190 Blackfin tuna
191 White mullet
192 Crevalle jack
193 *Florida gar*
194 Gizzard shad
195 Sunshine bass
196 Silver perch
197 Sea bass
198 Yellowmouth grouper
199 Striped mojarra
200 *Gulf flounder*
201 Cardinalfish
202 Angelfish
(continued)

U. S.

AQUATIC ORGANISMS (continued)

SYMBOL | SPECIES

FISH (100-299)

203 Blue runner
204 *Atlantic thread herring*
205 Chain pickerel
206 Rivulus
207 Key blenny
208 Striped bass
209 Atlantic sturgeon (S)
210 Suwannee bass
211 *Redbreast sunfish*
212 Spotted sunfish
213 Flier
214 Redfin pickerel
215 Red porgy
216 Alabama shad
217 Skipjack herring
218 *Spanish sardine*
219 Bluestripe shiner (S)
220 Shoal bass
221 Blackmouth shiner (S)
222 Saltmarsh topminnow
223 Crystal darter (S)
224 Harlequin darter
225 Okaloosa darter (F)
226 Flathead catfish
227 White bass
228 Yellow bass
229 Alligator gar
230 Blue sucker
231 *Frecklebelly madtom* (S)
232 Rock bass
233 Gafftopsail catfish
234 Silver seatrout
235 Bluenose shiner
236 River redhorse
237 Freckled darter
238 *Bluntnose minnow*
239 Bluntface shiner
240 Rainbow darter
241 Paddlefish (S)
242 Triggerfish
243 Squirrelfish
244 River darter (S)
245 *Rio Grande cichlid*
246 Silk snapper
(continued)

SY

TERRESTRIAL ORGANISMS

Shown in BROWN; species with special status shown in RED-(F) or (S) indicates species protected by Federal or state legislation; all Latin names given in text.

SYMBOL | SPECIES

PLANTS (400-499)

400 Lance-leaved wake-robin (S)
401 Florida royal palm (S)
402 Orchids (S)
403 Bromeliads (S)
404 *Royal palm-bald cypress forest*
405 Ferns (S)
406 Cacti (S)
407 Lignum vitae (S)
408 Palms (S)
409 Chapman's rhododendron (F)
410 Hollies (S)
411 Peppers (S)
412 *Coonties* (S)
413 Four-petal pawpaw (S)
414 Sandhill milkweed (S)
415 Sea lavender (S)
416 Catopsis (S)
417 Giant dewflower (S)
418 Pagoda dogwood (S)
419 *Okeechobee gourd* (S)
420 Manchineel (S)
421 Fall-flowering ixia (S)
422 Key cassia (S)

TERRESTRIAL ORGANISMS (continued)

SYMBOL | SPECIES

WADING BIRDS (600-649)

604 Great blue heron
605 Reddish egret (S)
606 White-faced ibis (S)
607 White ibis
608 Roseate spoonbill
609 Great egret
610 Snowy egret
611 Louisiana heron
612 Black-crowned night heron
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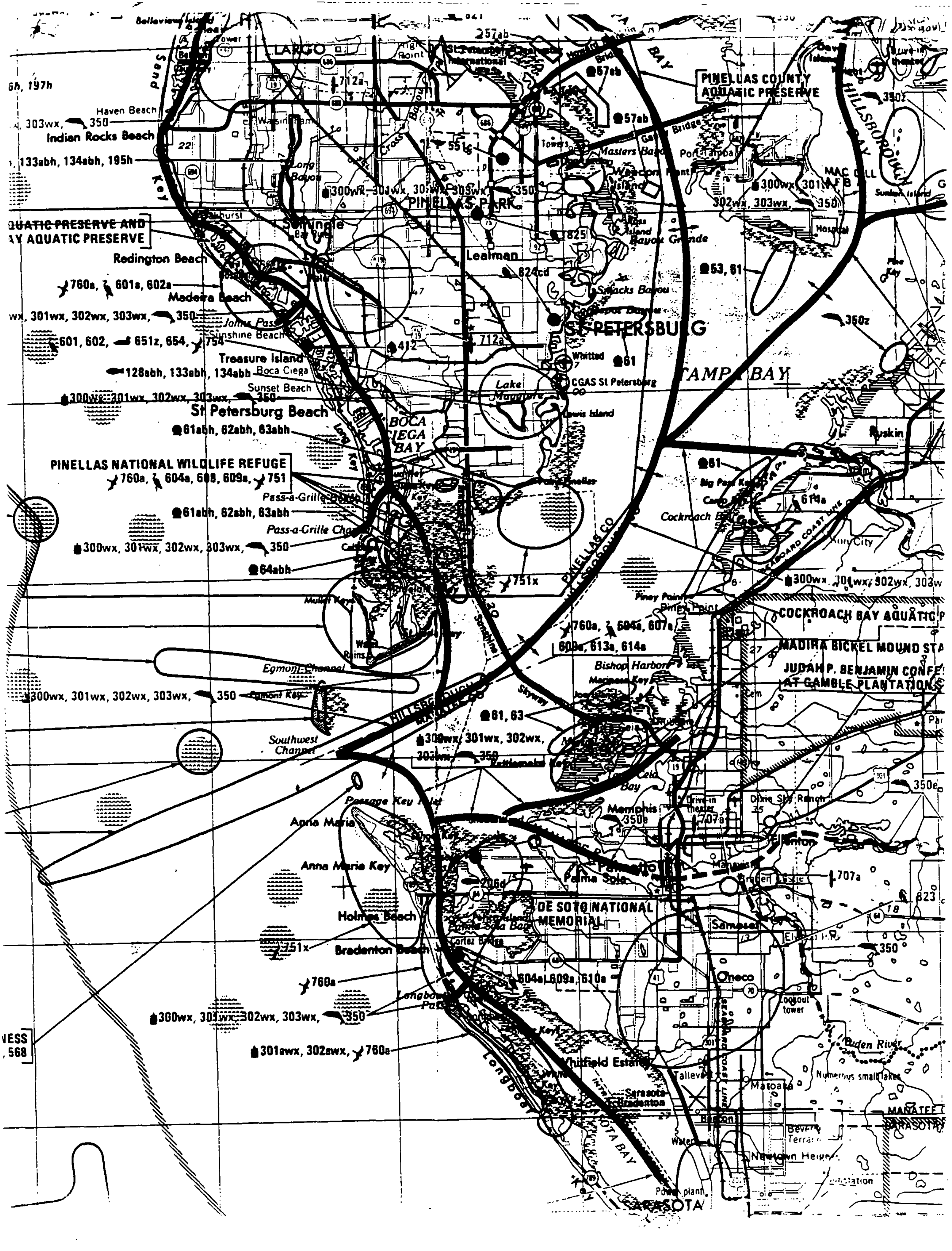
614 Cattle egret
615 Ibises
616 Yellow-crowned night heron
617 Rails
618 Least bittern
619 Gallinules
620 *Florida sandhill crane* (S)
621 Great white heron
622 American bittern
623 Limpkin
624 *Mississippi sandhill crane* (F)
625 Whooping crane (F)
626 Least grebe
627 Sandhill cranes

WATERFOWL



LARGO
PINELLAS COUNTY AQUATIC PRESERVE
HILLSBOROUGH BAY
Haven Beach
303wx, 350
Indian Rocks Beach
133abh, 134abh, 195h
Sand Key
Long Bayou
300wx, 301wx, 302wx, 303wx, 350
PINELLAS PARK
MAC DILL AFB
300wx, 301wx, 302wx, 303wx, 350
Seminole
AQUATIC PRESERVE AND
AY AQUATIC PRESERVE
Redington Beach
Lealman
825
Bayou Grande
824cd
53, 61
760a, 601a, 602a
Madeira Beach
301wx, 302wx, 303wx, 350
Johns Pass
Sunshine Beach
601, 602, 651z, 654, 754
ST PETERSBURG
350z
412
712a
Treasure Island
Boca Ciega
61
128abh, 133abh, 134abh
CGAS St Petersburg
TAMPA BAY
Sunset Beach
300wx, 301wx, 302wx, 303wx, 350
Lake Maggiore
St Petersburg Beach
Lewis Island
61abh, 62abh, 63abh
BOCA CIEGA BAY
Ruskin
PINELLAS NATIONAL WILDLIFE REFUGE
760a, 604a, 608, 609a, 751
61
Big Pass Key
Pass-a-Grille Beach
614a
61abh, 62abh, 63abh
Cockroach Bay
Pass-a-Grille Channel
300wx, 301wx, 302wx, 303wx, 350
64abh
751x
PINELLAS CO
300wx, 301wx, 302wx, 303w
Mullet Key
Piney Point
COCKROACH BAY AQUATIC P
760a, 604a, 607a
609a, 613a, 614a
MADIRA BICKEL MOUND STA
Bishop Harbor
Egmont Channel
JUDAH P. BENJAMIN CONFE
AT GAMBLE PLANTATION
300wx, 301wx, 302wx, 303wx, 350
Egmont Key
HILLSBOROUGH
MANATEE CO
61, 63
Southwest Channel
300wx, 301wx, 302wx,
303wx, 350
Rattlesnake Key
Sunshine Skyway
350e
Passage Key Inlet
Memphis
350a
707a
Dixie Sky Ranch
Anna Maria
Ellenton
Anna Maria Key
Palmetto
Palma Sola
707a
206d
823
DE SOTO NATIONAL MEMORIAL
Holmes Beach
Samoset
751x
Bradenton Beach
Cortez Bridge
350
604a, 609a, 610a
760a
Oneco
Longboat Pass
300wx, 301wx, 302wx, 303wx, 350
Lookout tower
NESS
, 568
301awx, 302awx, 760a
Braden River
Whitfield Estates
Longboat Key
Numerous small lakes
Sarasota-Bradenton
MANATEE
SARASOTA
Newtown Heights
SARASOTA BAY
Power plant
SARASOTA

2C11D24

REFERENCE # 15

GROUND-WATER RESOURCE AVAILABILITY INVENTORY:

MANATEE COUNTY, FLORIDA

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
MARCH 1988

GROUND-WATER RESOURCE AVAILABILITY INVENTORY:
MANATEE COUNTY, FLORIDA

PREPARED BY: RESOURCE MANAGEMENT AND PLANNING DEPARTMENTS OF THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

MARCH 1988

PRINCIPAL CONTRIBUTORS

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composed of carbonate deposits (usually dolomitic) that contain varying amounts of interbedded quartz sand, clay, and phosphate. The middle section consists of interbedded sandy carbonate, clayey sand, and sandy clay. The upper Hawthorn section is predominantly composed of clastic deposits that consist of quartz, phosphate sand and pebbles, and light green to a moderately dark gray clay (Hall, 1983). The trifold subdivision of the Hawthorn Formation is most apparent in the south. Elsewhere, one or two of these units may be absent, or the upper unit may lie directly over the lowermost unit. In the north, the units become less distinctive and merge to a single unit where a sandy phosphatic clay perdominates, or the Formation is absent. The thickness of the entire Hawthorn Formation varies from thin to absent in the northern areas of the SWCFGWB to greater than 600 feet in the southern areas.

Oligocene - The only formation of this epoch is the Suwannee Limestone. It is composed of hard, yellow or creamy fossiliferous limestone, which locally has an orange tinge. Interbeds may contain quartz sand, and dolomite is common toward the unit's base from the Tampa Bay area southward. The upper part may contain thin chert lenses and be highly macrofossiliferous. The Suwannee is exposed in parts of Pasco County, and in the northeast corner of Hillsborough County, and pinches out in Polk County. The Suwannee is as much as 300 feet thick in the southern areas of the SWCFGWB.

Eocene Epoch - The Eocene formations within the SWCFGWB consist of the Ocala Limestone, Avon Park Formation, and Oldsmar Formation, in descending order. The Ocala Limestone consists of three units. In descending order these units are the Crystal River, Williston, and Inglis. All three units generally consists of a coquinic foraminiferal limestone, usually cream to white in color. The Inglis Member frequently contains gray to brown dolomite, and chert layers that can be present throughout the entire Ocala Limestone. The Ocala Limestone outcrops in northern Polk and southern Sumter Counties within the Green Swamp area (Pride and others, 1966). The Ocala ranges in thickness from less than 300 feet in the northern areas of the SWCFGWB to greater than 600 feet in thickness in the southern areas.

The Ocala is unconformably underlain; by the middle Eocene Avon Park Formation. Lithologically, the Avon Park is composed of fossililferous limestone and dolostone. The limestone is moderate brown, dark-yellow brown to rusty-yellow brown, porous and very fine to medium grained and may be crystalline or saccharoidal in texture. The top of the Avon Park may contain peat or carbonaceous layers and the bottom may contain small lenses of evaporite. The Avon Park Formation thickens to greater than 1,000 feet in the SWCFGWB. The Avon Park is the deepest potable water bearing formation in the SWCFGWB, therefore, older geologic formations will not be discussed.

KARST ACTIVITY

Florida's landscape, including the SWCFGWB, is dominated by features of karst topography. Karst topography develops where rainfall drains internally and rocks are susceptible to solution (Ritter, 1979). In these areas, the solution process can create and enlarge cavities within the rocks and allow underground circulation of water which, in turn, promotes further solution. This leads to

TABLE 3: **Major springs and flow in the Southern West-Central Florida Ground-Water Basin (from Roseneau and others, 1977).**

INDEX	SPRINGS	DISCHG(CFS)	INDEX	SPRINGS	DISCHG(CFS)
1	SALT	9.5	7	SIX MILE CREEK	1.5
2	CRYSTAL	60	8	BUCKHORN	15.5
3	HEALTH	6.5	9	LITHIA	51
4	SULPHUR	44	10	KISSENGEN	9.5
5	LETTUCE LAKE	9.5	11	WARM MINERAL	1
6	EUREKA	1.5	12	UNNAMED	30

GROUND WATER

Surficial Aquifer System

A distinct surficial aquifer system exists throughout nearly all of the SWCFGWB and consists of marine and non-marine quartz sand, clayey sand, shell, shelly marl, and phosphorite, with occasional stringers of marl and limestone. The surficial system extends from land surface to the top of the upper confining bed of the Caloosahatchee Marl, Bone Valley Formation, Tamiami Formation, or Hawthorn Formation, whichever is first stratigraphically encountered. Water in the surficial aquifer system is generally unconfined; however, locally within the aquifer system are weak semi-confined layers that poorly confine the ground water. Average thickness of the aquifer is about 25 feet, but ranges from a foot or less, where limestone or clay outcrop or are near land surface, to several hundred feet beneath the Highland Ridge (Figure 13). Extreme thicknesses of 300 to 600 feet or more have been reported along the eastern side of the Lake Wales Ridge in Polk County (Stewart, 1966).

Surficial Aquifer Hydraulic Properties

Hydraulic properties of the surficial aquifer system in the SWCFGWB vary widely due to variation in types of material that comprise the aquifer; its physical characteristics, such as grain size and sorting; and thickness of the saturated zone. Hydraulic properties for the surficial aquifer system are listed in Table 4. The locations of the aquifer test sites at which these values were derived are given in Figure 19.

Transmissivity of the surficial aquifer system ranges from about 20 feet squared per day (ft^2/d) where fine clayey sand predominates, to greater than 5,000 ft^2/d in some clean shell beds in the southern areas of the SWCFGWB. Transmissivities are lowest to the north and along the coast where the aquifer is composed of mostly fine grained clastics, and saturated thickness is least. Transmissivities are greatest in southern Sarasota, Charlotte, and Lee Counties.

Specific yield of the surficial aquifer ranges from 0.05 to 0.3 (Wilson and Gerhart, 1980). Determinations of vertical hydraulic conductivity have been made from lab tests on undisturbed samples, range from 0.12×10^{-5} to 13 feet per day (ft/d) (Sinclair, 1974; Hutchinson and Stewart, 1978; Healy and Hunn, 1984). Determinations of horizontal hydraulic conductivity range from 0.0028 ft/d to greater than 1,000 ft/d (Healy and Hunn, 1984).

III. MANATEE COUNTY OVERVIEW

Geographic Setting, Physiography - Topography, and Drainage

Manatee County is located on the west-central coast of Florida and fronts on Tampa Bay at its southern-most point. Manatee County is bounded by Hillsborough County on the north, Hardee and DeSoto Counties to the east, Sarasota County on the south, and the Gulf of Mexico and Tampa Bay to the west (Figure 53). Manatee County contains about 739 square miles of land area and 46 square miles of inland surface-water area. Land surface altitudes range from sea level along the coast to about 135 feet above NGVD in the northeast (Figure 54).

The physiographic provinces of Manatee County were described by White (1970). These provinces are the Gulf Coastal Lowlands, the DeSoto Plain, and the Polk Upland (Figure 6). The ancient stands of sea level above its present level during Pleistocene time shaped the topography into marine terraces across the county. The Pamlico Terrace, generally less than 20 feet above NGVD, and the Talbot Terrace, about 40 feet above NGVD, form the relatively flat, poorly drained Gulf Coastal Lowlands. The Penholoway Terrace, about 60 to 70 feet above NGVD and the Wicomaco Terrace, about 90 to 100 feet above NGVD, make up the DeSoto Plain. The highest and oldest surface is the Sunderland Terrace that formed when the sea was 170 feet above the present level. The Polk Upland physiographic unit was formed by the Sunderland Terrace. Recent stream and river erosion have modified these terraces but large areas of relatively flat land remain where the drainage is poor.

Principal surface-water drainage for the county is through the Manatee, Little Manatee, Myakka Rivers, and their tributaries. Many coastal streams drain directly into the Gulf of Mexico. The large flatland areas of the county are poorly drained and contain many small, shallow lakes and swamps. A canal network has been dug throughout the county to augment natural drainage (Brown, 1983).

Climate

The climate of Manatee County is humid and sub-tropical, characterized by high mean annual rainfall and temperature. Warm humid summers and mild winters are the result of the low latitude and the stabilizing affect of the Gulf of Mexico and the Atlantic Ocean.

Data collected by the National Weather Service indicate that the mean annual air temperature in the county is about 72°F, and mean monthly temperatures range from 60°F in winter to 80°F in summer. Summer temperatures usually peak in the low to mid-90's but are moderated by frequent afternoon convectional thundershowers. Winter temperatures vary the most during late winter when cold fronts bring arctic air from the northwest. These fronts may bring minimal temperatures below freezing but day light temperatures rarely reach freezing levels. Cold weather generally lasts only two to three days and are separated by warm days (Wolf and others, 1986). Average low temperatures are near 50°F during the coldest months (December, January, and February).

Lessor amounts of water are withdrawn from the surficial and intermediate aquifer systems and are used primarily for domestic supply, with other uses including stock watering, agricultural irrigation, and small public supplies. Most irrigation wells that penetrate the Floridan aquifer are also open to the intermediate system.

Surficial Aquifer System(*)

In Manatee County, the surficial aquifer system is composed primarily of deposits of sand, gravel, shells, and limestone whose composition may vary laterally and vertically. The deposits comprise the Pliocene to Recent age undifferentiated sands, terrace deposits, and the Bone Valley Formation. In the eastern and central part of Manatee County, the aquifer consists mostly of medium to fine-grained, well-sorted, quartz sand and ranges in thickness from about 10 to 90 feet (Figure 65). Within this area, the sands contain a hardpan layer that consists of sand and carbonaceous and limonitic material that averages about 5 feet in thickness. The hardpan retards vertical flow of water. The sandy clays of the Bone Valley and Hawthorn Formations form the base of the surficial system in eastern Manatee County. In the western part of the county, the system consists of sand, sandy limestone, and shell and ranges from about 1 to 20 feet in thickness. The sandy clays, clays, and marls form the base of the surficial system. A listing of aquifer coefficients derived from aquifer tests of the surficial aquifer system in the SWCFGWB are included in Table 3. Locations of these tests are given in Figure 19. Seasonal fluctuations in the water table are generally less than 5 feet and are generally lowest in April or May and highest in September.

The direction of ground-water flow in the water table is generally west and south in Manatee County. The configuration of the water surface is similar to that of the land surface. Water surface is at sea level along the coast and increases to altitudes of about 130 feet above NGVD in the northeast area of the county. Depth to the water table ranges from zero in coastal and flat, poorly drained areas, to about 10 feet below land surface in topographically high areas. The average depth to the water table is about 5 feet.

In some areas, the surficial aquifer is confined by layers of hardpan, clay, or limestone. Many shallow wells in the county penetrate one or more of these confining layers. Generally, the artesian pressure is insufficient to produce flowing wells (Peek, 1958b). The surficial aquifer supplies the least quantity of water in the county. Small volumes of water are used for domestic use, lawn irrigation, or stock watering. Most wells that tap the surficial aquifer have small diameters and yield less than 50 GPM. Most surficial wells are finished as open holes; some are screened.

Aquifer Properties

The transmissivity of the surficial aquifer in Manatee County ranges from less than 267 to about 5,304 ft^2/d (Table 3). The transmissivity of the thick sand and phosphorite deposits in the south-central part of the county probably ranges from about 1,000 to 2,000 ft^2/d (Brown, 1983). Similar transmissivity was reported by Wilson (1972) and Hutchinson and Wilson (1977a) for surficial deposits in

DeSoto and Hardee Counties. Transmissivity of the surficial aquifer in Charlotte County south of Manatee County, that consists of sand and interbedded shell and limestone similar to deposits in western Manatee County, was reported to be about 7,000 ft^2/d (Sutcliffe, 1975).

The storage coefficient of an unconfined aquifer is virtually equal to the specific yield, which is commonly determined by laboratory drainage tests. In Manatee County, the storage coefficient of the surficial aquifer is 0.05 to 0.12 (Table 3). Similar estimates of storage coefficients based on laboratory specific-yield tests of similar deposits in Polk County (Pride and others, 1966) and in Hillsborough County (Sinclair, 1974) and on an aquifer test in southeastern Hillsborough County (Hutchinson, 1978).

Water Quality (*)

The chemical quality of ground water is primarily affected by the quality of rainfall that recharges to the aquifer, types of rocks in which water is in contact, and length of time water has been circulating within the aquifers. In Manatee County, the chemical quality is also affected by intrusion of seawater or the mixing of relatively fresh water with highly mineralized water, believed to be residual seawater within the water-bearing formations (Peek, 1958a).

Wells that penetrate deep water-bearing zones are commonly constructed with tens to hundreds of feet of open hole and are open to one or more water-bearing zones. Water in each zone has distinctive water-quality characteristics. Thus, the quality of water pumped depends on which zones are tapped and the proportion of water derived from each.

The dissolved mineral content of water from the surficial system in Manatee County varies greatly. Water is generally of potable quality except near the coast and tidally affected streams where saltwater intrusion has taken place.

In northeastern Manatee County, the surficial system is composed of relatively insoluble, quartz sand resulting in water that is low in mineral content and hardness (Figure 66). Dissolved solids concentrations are usually less than 300 mg/L. Concentrations of chloride and sulfate are also low, usually less than 10 mg/L and 5 mg/L, respectively. Most water that is soft and low in mineral content has a relatively low pH.

Near the coast and tidally affected streams, water in the surficial system has concentrations of dissolved solids and chlorides of more than 200 and 50 mg/L, respectively. Concentrations of sulfate vary considerably, but are usually less than 20 mg/L. In many places along the coast, water in the surficial system is highly mineralized, approaching that of seawater. In some low-lying and coastal areas, the surficial system is highly mineralized because of infiltration or intrusion by seawater, leakage from improperly constructed wells, uncapped flowing wells, and irrigation water from wells that contain moderate to highly mineralized water (Joyner and Sutcliffe, 1976). Appendix D and E lists the water quality sampling sites and data utilized to modify and update the water quality maps for Manatee County.

Aquifer Properties(*)

The transmissivity of the Floridan aquifer system ranges from about 4,900 to 160,000 ft^2/d (Table 3). Transmissivity of the dolomite unit of the Avon Park Limestone lower water-bearing zone ranges from about 20,000 to 700,000 ft^2/d. Most production wells, however, are also open to the lower part of the middle zone (Ocala Limestone). In eastern and southeastern Manatee County, the transmissivity of this zone ranges from 60,000 to 150,000 ft^2/d (Brown, 1983). In western Manatee County, the transmissivity of the upper and middle zones is about 15,000 ft^2/d (Peek, 1958a). In northeastern Manatee County, Guyton and Associates (1976) reported an estimated transmissivity of about 3,300 ft^2/d for the Suwannee Limestone and also indicated that little water can be produced from the Tampa Limestone.

The storage coefficients of most confined aquifers range from about 10^{-5} to 10^{-3} and are about 10^{-6} per foot of thickness (Lohman, 1972). The storage coefficient of the Upper Floridan aquifer in Manatee County ranges from 0.0002 to 0.002 (Table 3). Leakance from the surficial aquifer system to the Upper Floridan aquifer where differences in head are favorable could not be determined accurately from aquifer tests. This was due to (1) extreme thickness of the upper confining beds (about 200 to 400 feet), (2) small drawdowns due to high transmissivity of the aquifer, (3) large fluctuations in background water levels due to seasonal irrigation, and (4) short duration of most aquifer tests (less than 30 days). Leakance to the Upper Floridan aquifer is probably less than 10^{-4} (ft/d)/ft and is estimated to range from 0.00004 to 0.0027 (ft/d)/ft. Estimated leakances determined from aquifer tests range from 10^{-6} to 10^{-3} (ft/d)/ft. In northeastern Manatee County, William F. Guyton and Associates (1976) estimated leakance to be about 1.34×10^{-6} to 1.34×10^{-5} (ft/d)/ft.

Water Quality(*)

Water in the Upper Floridan aquifer is generally more mineralized than water from the surficial and intermediate aquifer systems. Mineral content of the water within the aquifer varies vertically and areally. Mineral content of the water generally increases with depth of the aquifer penetrated. Water from wells open to the upper water-bearing zone is generally less mineralized than water from wells open to the middle water-bearing zones. Water from wells open to the lower water-bearing zone or to the full thickness of the aquifer has the highest mineralization.

Dissolved Solids.--Concentrations of dissolved solids in water from the Upper Floridan aquifer range from about 300 to more than 2,500 mg/L in the three major water-bearing zones. Concentrations generally increase with depth and laterally from the northeastern part of the county towards the west and south. Dissolved solids in water from wells penetrating the upper zone exceed 500 mg/L in the western and southern parts of the county (Figure 68a).

Water from wells penetrating the middle zone has dissolved solids concentrations ranging from about 300 to 1,800 mg/L (Figure 68b). In northeastern Manatee County, dissolved solids are less than 500 mg/L, and in the western and southeastern parts of the county, subdued. Figure 5 illustrates east-west and north-south trending cross-sections that depict the topography in the SWCFGWB. Figure 6 illustrates the physiographic regions of the SWCFGWB.

The dominant river basins, ranked in descending stream flow order are the Peace, Hillsborough, Alafia, Shell Creek, Myakka, Horse Creek, and Manatee Rivers. All of these rivers have an average flow greater than 100 cubic feet per second (cfs). The major rivers begin on the Polk Upland and flow west or southwest to the Gulf of Mexico. The major wetland is the Green Swamp but many of the river flood plains are low, wetland strands.

There are numerous second and third magnitude springs in the northern area of the SWCFGWB but south of central Hillsborough and Polk almost no springs exist today. The only three springs reported are Pinehurst, Little Salt, and Warm Mineral Springs, which are all located in Sarasota County. The latter two springs exceed potable standards for salts concentration. Virtually all springflow is derived from the Floridan aquifer system.

The geology, topography, and drainage are all interdependent with water erosion shaping the limestone chemically and mechanically. The karst nature of the limestone results in solution features redirecting runoff underground. The sand and soft limestone supporting the flat to hilly topography was first shaped by beach erosion terracing the sand and stone. Afterwards, weak limestone caverns collapsed and surface erosion reshaped the highland sands. The southern plains and lowlands lack the underground drainage and typical karst topography. Surficial erosion by rivers and transgressive/regressive seas dominate the land forms. Nutrients and fresh water entering the Gulf also supports a large estuary system along the coast.

The SWCFGWB is characterized by karst terrain, in the northern and eastern areas, developed through the dissolution of the underlying shallow sinkholes. Surface drainage is absent or poorly developed in most of these areas, but waters from Hillsborough, Anclote, and Pithlachascotee Rivers flow through well-defined stream channels. Thick clay layers of the Bone Valley, Caloosahatchee, and Hawthorn Formations subdue karst activity in the flat lands of the central and southern SWCFGWB.

CLIMATE

The climate of the SWCFGWB is characterized by long, warm, humid summers and short, mild winters. Average monthly temperatures range from 61° F in January to 82° F in July and August (National Oceanic and Atmospheric Administration (NOAA), 1986). Average annual temperature is 73° F.

Some rainfall normally occurs during each month, but a SWCFGWB high rainfall season extends from June through September and a low rainfall season extends from October through May. The winter rainfall is relatively light because west-central Florida is south of the normal southern limit of winter frontal systems. About sixty percent of the annual rainfall occurs during the rainy season and is derived principally from convectional storms. The Weather Bureau Stations at St. Leo, Bartow, and Punta Gorda were chosen to represent the SWCFGWB. Figure 7 shows the historic median and mean monthly rainfall. Figure 8 depicts the annual total rainfall record for these three weather stations in the SWCFGWB. Spatially, summer rainfall is highly variable; areas only a few miles apart often receive widely differing amounts of rain.

Estimates of evapotranspiration (ET) within the SWCFGWB vary; however, approximately 39 inches per year is generally accepted. Close to sixty percent of the total ET occurs in the six month period from May to October (SWFWMD, 1978). The highest ET rates occur in May and June.

GEOLOGY OF THE BASIN

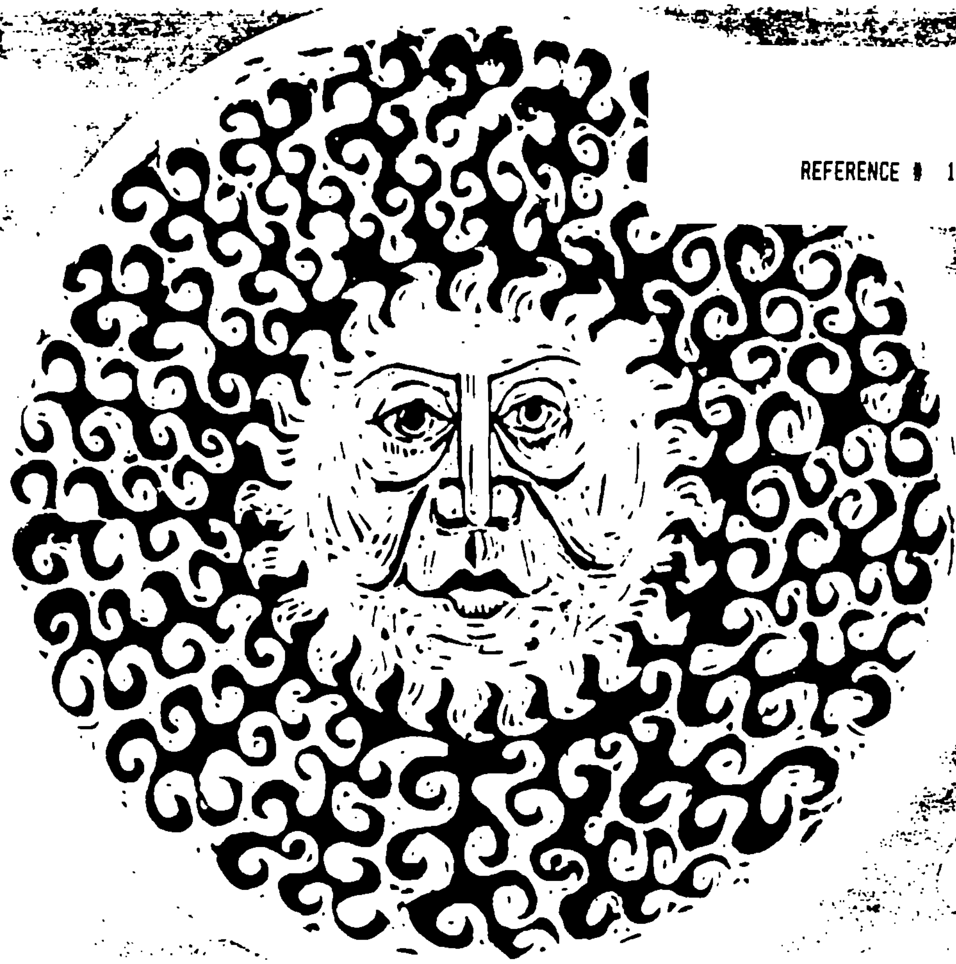
Overview

The SWCFGWB is underlain by a thick sequence of Cretaceous and Tertiary carbonate rocks overlain by a wedge-shaped sequence of interbedded carbonate and clastic deposits. The principal hydrogeologic units are the surficial, intermediate, and Floridan aquifer systems, as described by the Ad Hoc Committee on Florida Hydrostratigraphic Unit Definition, 1984. The upper one to two thousand feet of the limestones and dolomites that comprise the Floridan aquifer system are considered the Upper Floridan aquifer (Miller, 1982). Table 1 contains the lithologic characteristics and water supply properties of the potable water bearing deposits in the SWCFGWB. Figures 9 and 10 is a hydrogeologic cross-section and a surficial geologic map of the SWCFGWB, respectively.

The Upper Floridan aquifer is a solution-riddled and faulted limestone comprised of chemically precipated limestones and dolomites that contain shells and shell fragments of marine origin. The system was deposited throughout the Tertiary period. This aquifer system is the principal storage and water conveying component of the hydrologic system in the SWCFGWB. The carbonate units that are hydrologically significant, in ascending order include the Avon Park Formation, Ocala Limestone, Suwannee Limestone, Tampa Limestone, and portions of the Hawthorn Formation that are in hydrologic connection with underlying units. These units range in age from Eocene to Miocene. The Tampa Limestone of Miocene Age is generally thin to absent throughout the northern and eastern areas of the SWCFGWB. In the SWCFGWB the Upper Floridan aquifer may contain one or more inter-aquifer confining beds which, in turn, produce a multi-aquifer system. The system thickens from less than 800 feet in the north to greater than 2200 feet in the south (Figure 11).

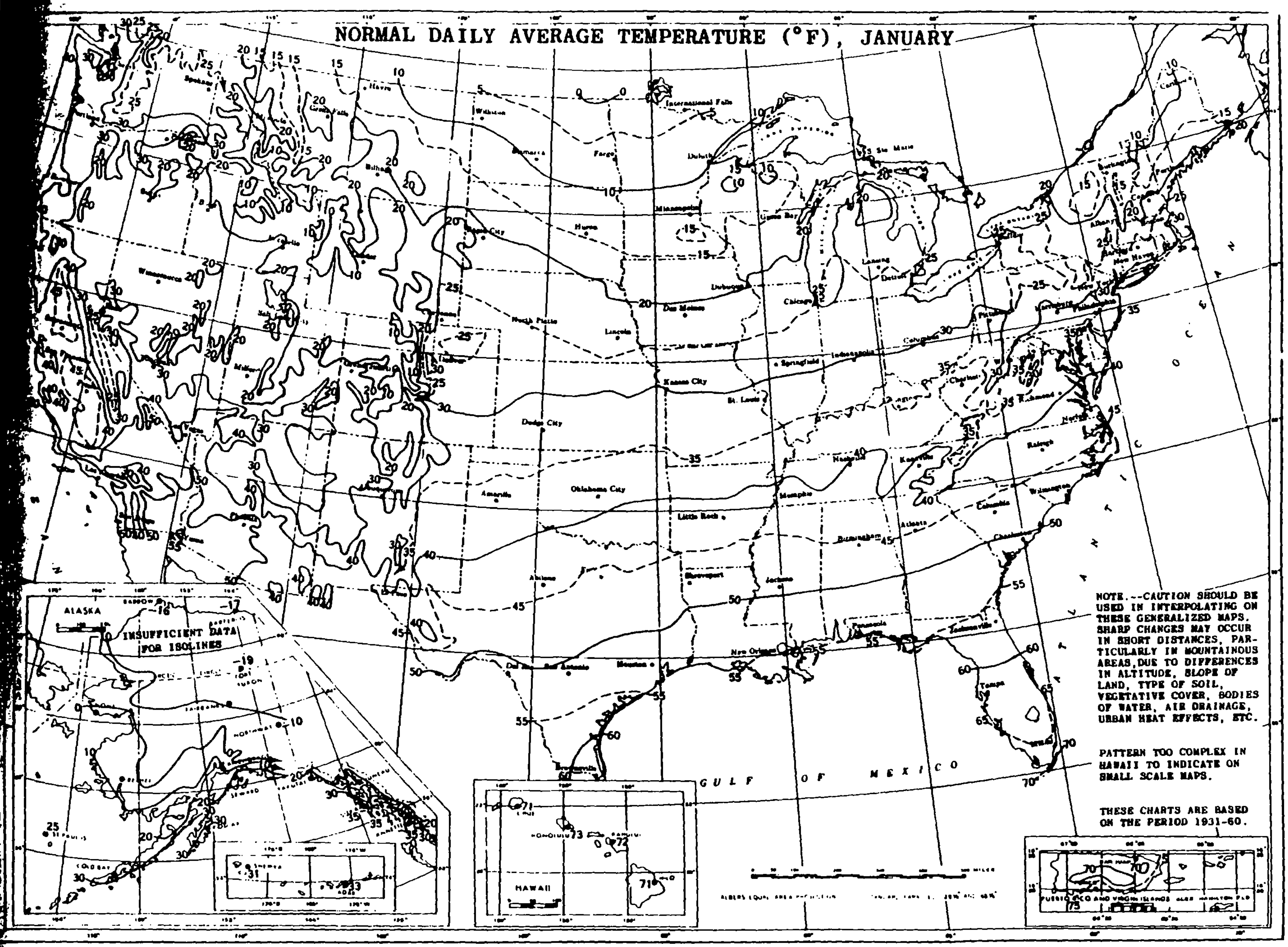
Early in the Miocene Epoch, terrestrial deposits were carried by rivers from the north and intermixed with the upper Tertiary deposits. Clastic deposition continued through the Pliocene and Pleistocene Epochs with phosphatic enrichment of clastic sediments becoming more pronounced. The Hawthorn Formation of Miocene age and the Caloosahatchee, Tamiami, and Bone Valley Formations of Pliocene and Pleistocene age predominately comprise the intermediate aquifer system. In areas of Polk, Manatee, Hardee, DeSoto, Sarasota, and Charlotte Counties, sand and clay beds within the Tampa Limestone are hydraulically connected to the overlying units and are also included in the intermediate aquifer system (Corral and Wolansky, 1984). Units of the intermediate system consist of sand, gravel,

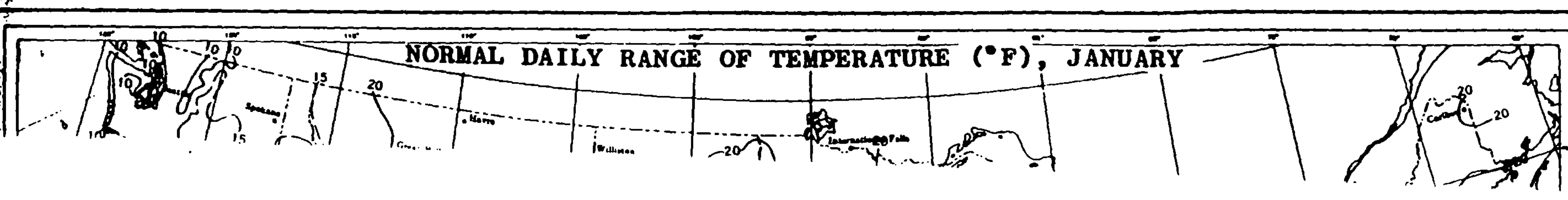
REFERENCE # 16



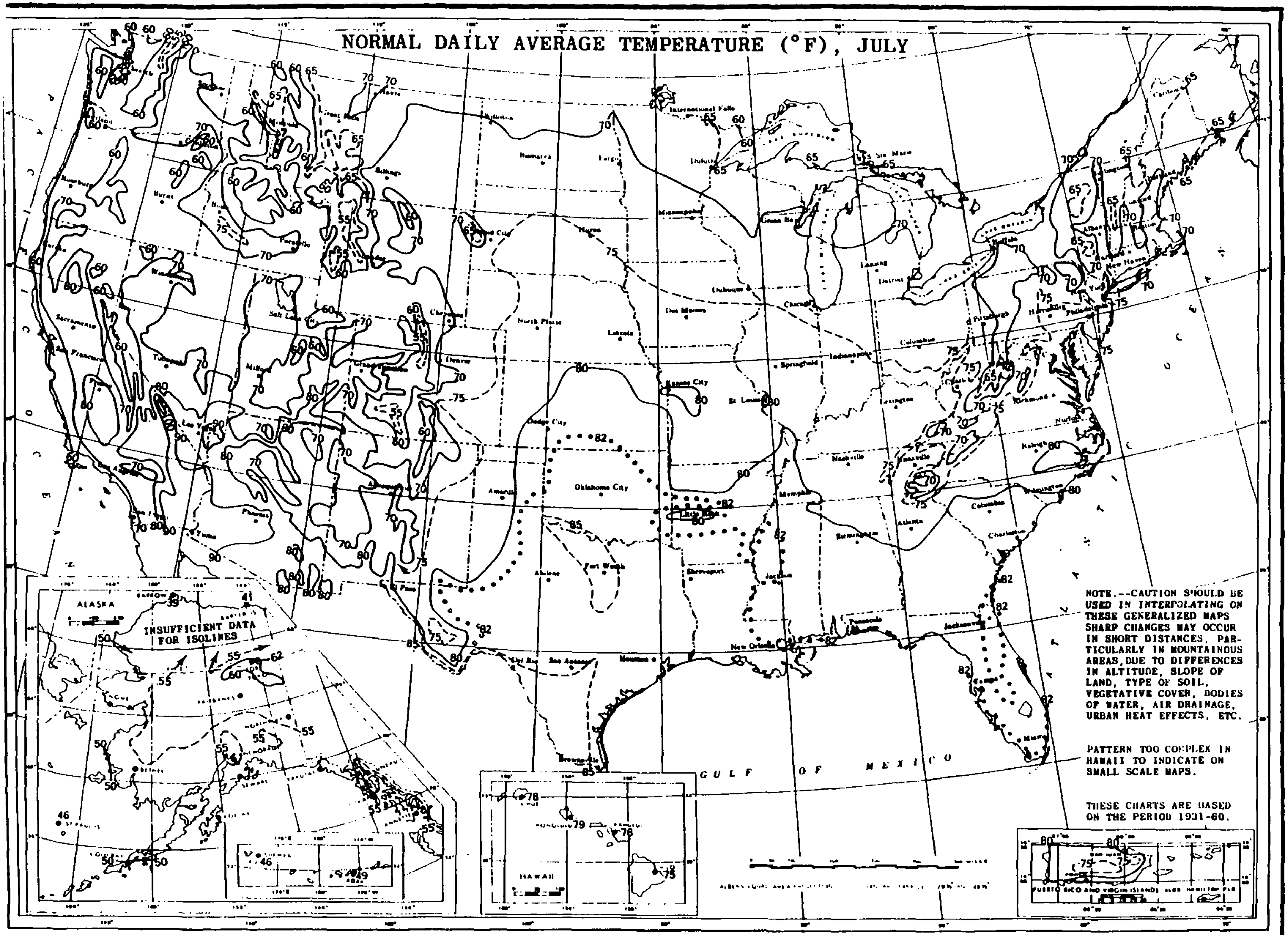
CLIMATIC ATLAS OF THE UNITED STATES

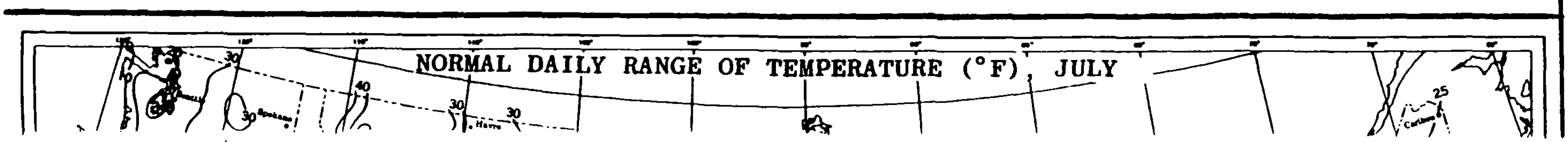
ıtal Scien;e Services Administration . Environmental Data Se

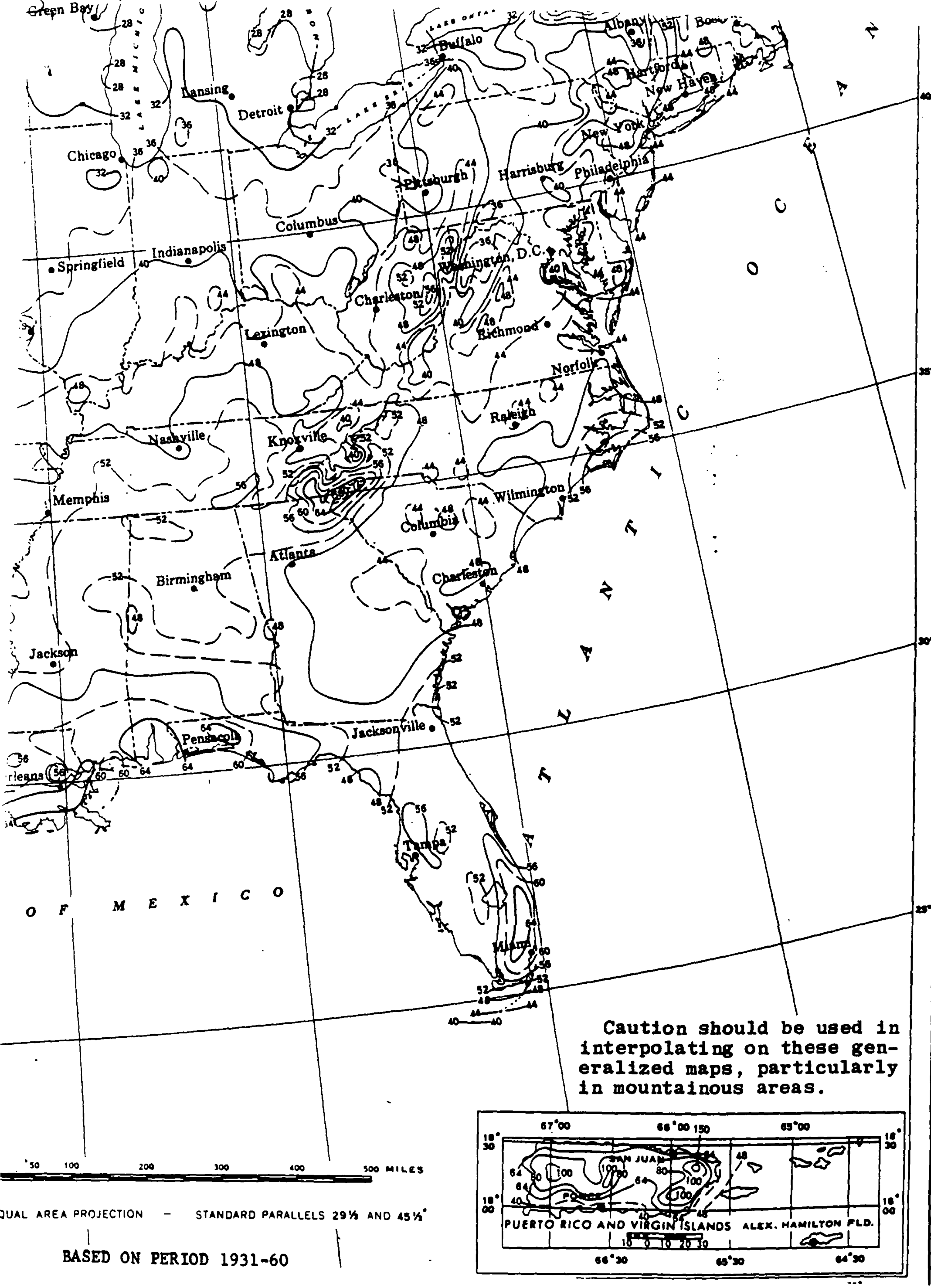

NORMAL DAILY AVERAGE TEMPERATURE (°F), JANUARY
NOTE.--CAUTION SHOULD BE USED IN INTERPOLATING ON THESE GENERALIZED MAPS. SHARP CHANGES MAY OCCUR IN SHORT DISTANCES, PARTICULARLY IN MOUNTAINOUS AREAS, DUE TO DIFFERENCES IN ALTITUDE, SLOPE OF LAND, TYPE OF SOIL, VEGETATIVE COVER, BODIES OF WATER, AIR DRAINAGE, URBAN HEAT EFFECTS, ETC.
PATTERN TOO COMPLEX IN HAWAII TO INDICATE ON SMALL SCALE MAPS.
THESE CHARTS ARE BASED ON THE PERIOD 1931-60.
ALASKA
INSUFFICIENT DATA FOR ISOLINES
HAWAII
GULF OF MEXICO
ATLANTIC OCEAN


NORMAL DAILY RANGE OF TEMPERATURE (°F), JANUARY

.E, AND RANGE OF TEMPERATURE (°F), JULY



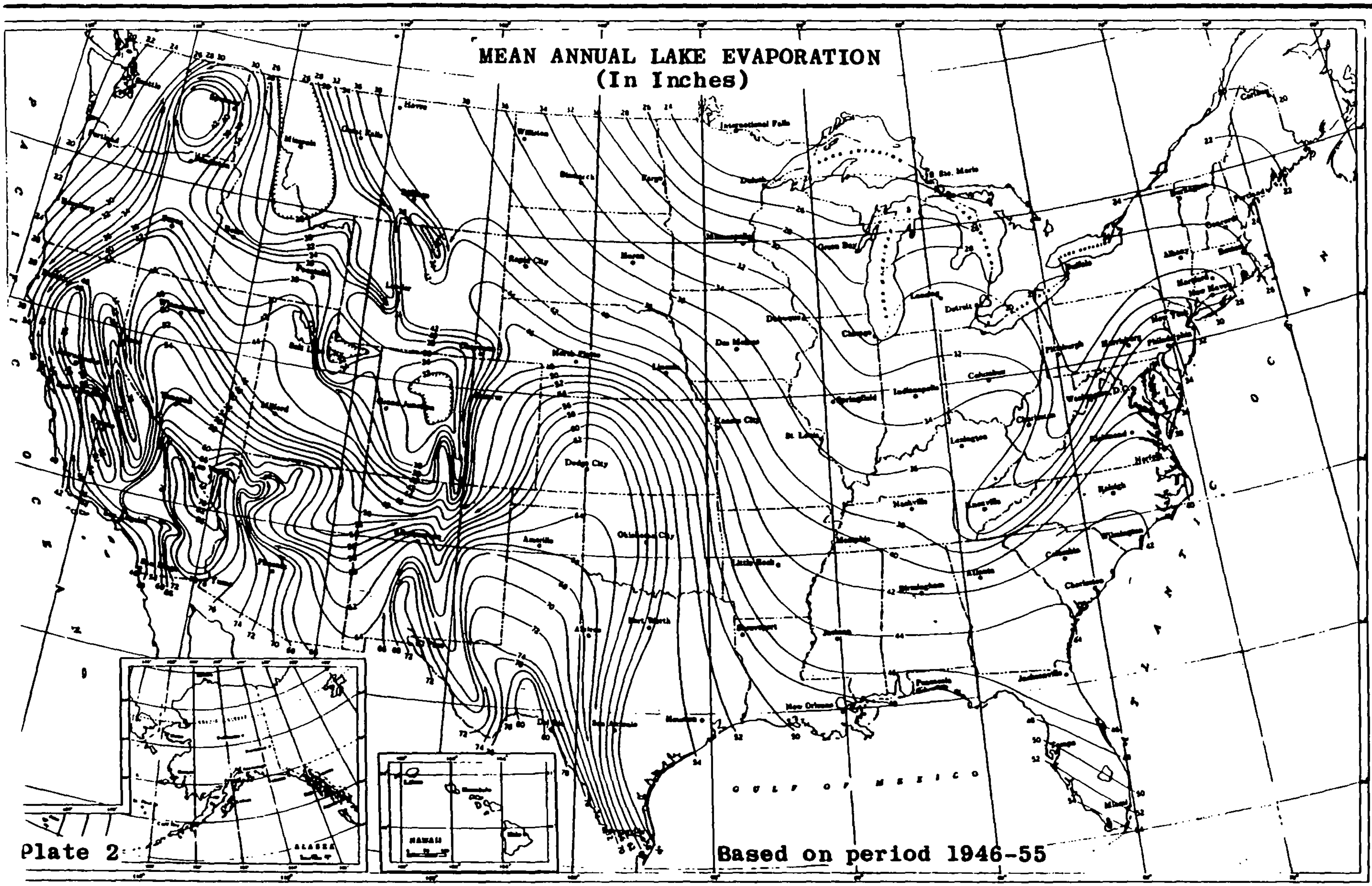


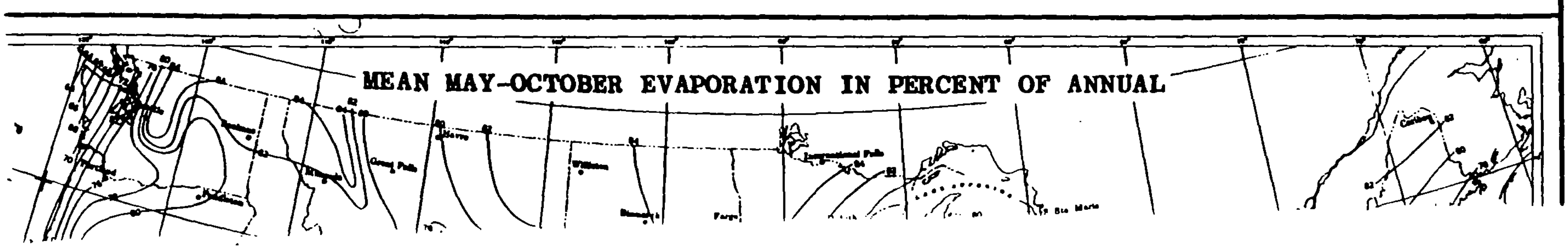


Caution should be used in interpolating on these generalized maps, particularly in mountainous areas.

BASED ON PERIOD 1931-60

AKE EVAPORATION





U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

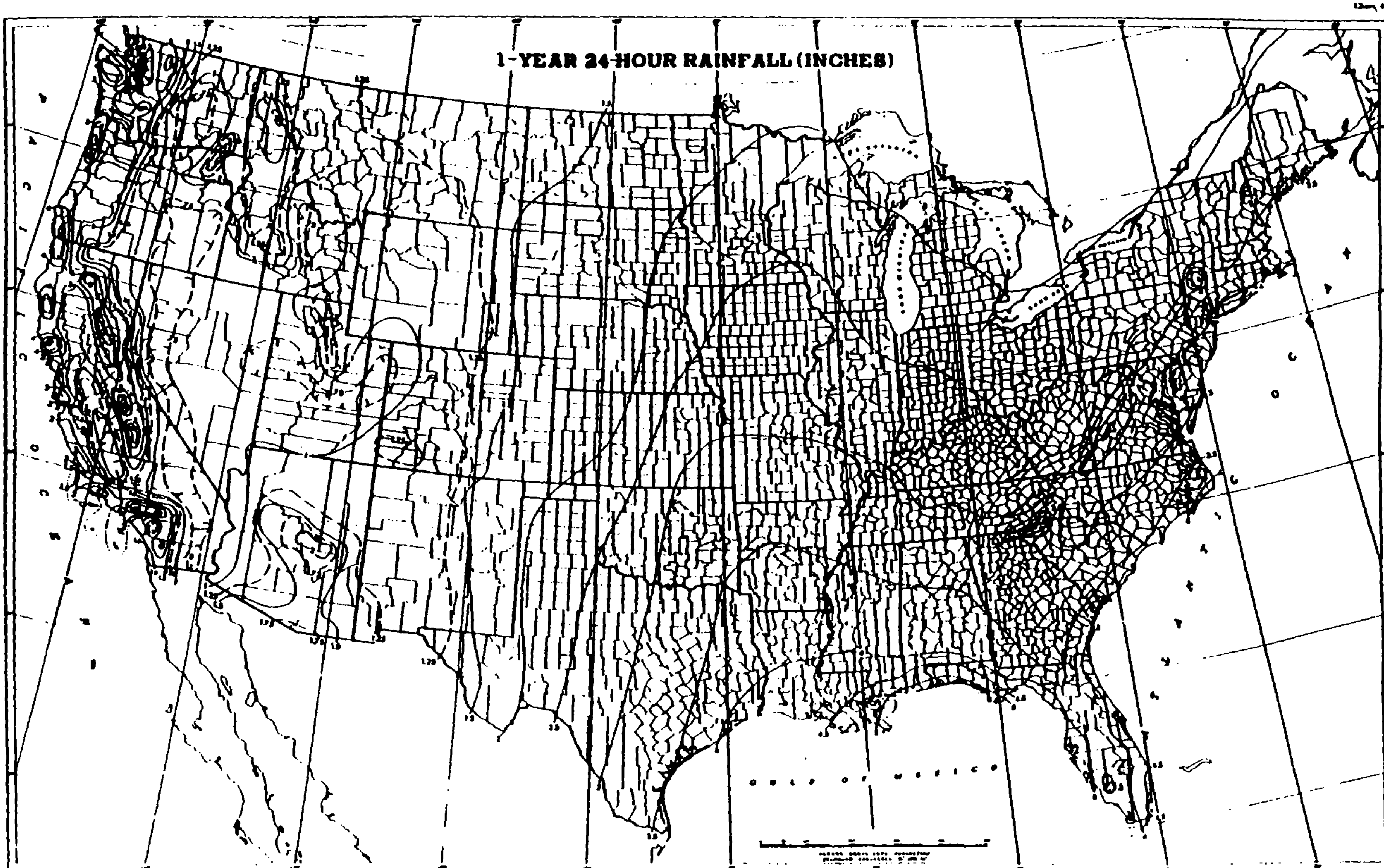
WEATHER BUREAU
F. W. Reichelderfer, Chief

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture


1-YEAR 24-HOUR RAINFALL (INCHES)
GULF OF MEXICO

REFERENCE # 18

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MANATEE COUNTY, FLORIDA
(UNINCORPORATED AREAS)

PANEL 19 OF 550
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120153 0019 B

MAP REVISED:
MARCH 15, 1984

FEDERAL EMERGENCY MANAGEMENT AGENCY

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MANATEE COUNTY, FLORIDA
(UNINCORPORATED AREAS)

PANEL 18 OF 550
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120153 0018 B

MAP REVISED:
MARCH 15, 1984

FEDERAL EMERGENCY MANAGEMENT AGENCY

Federal Emergency Management Agency

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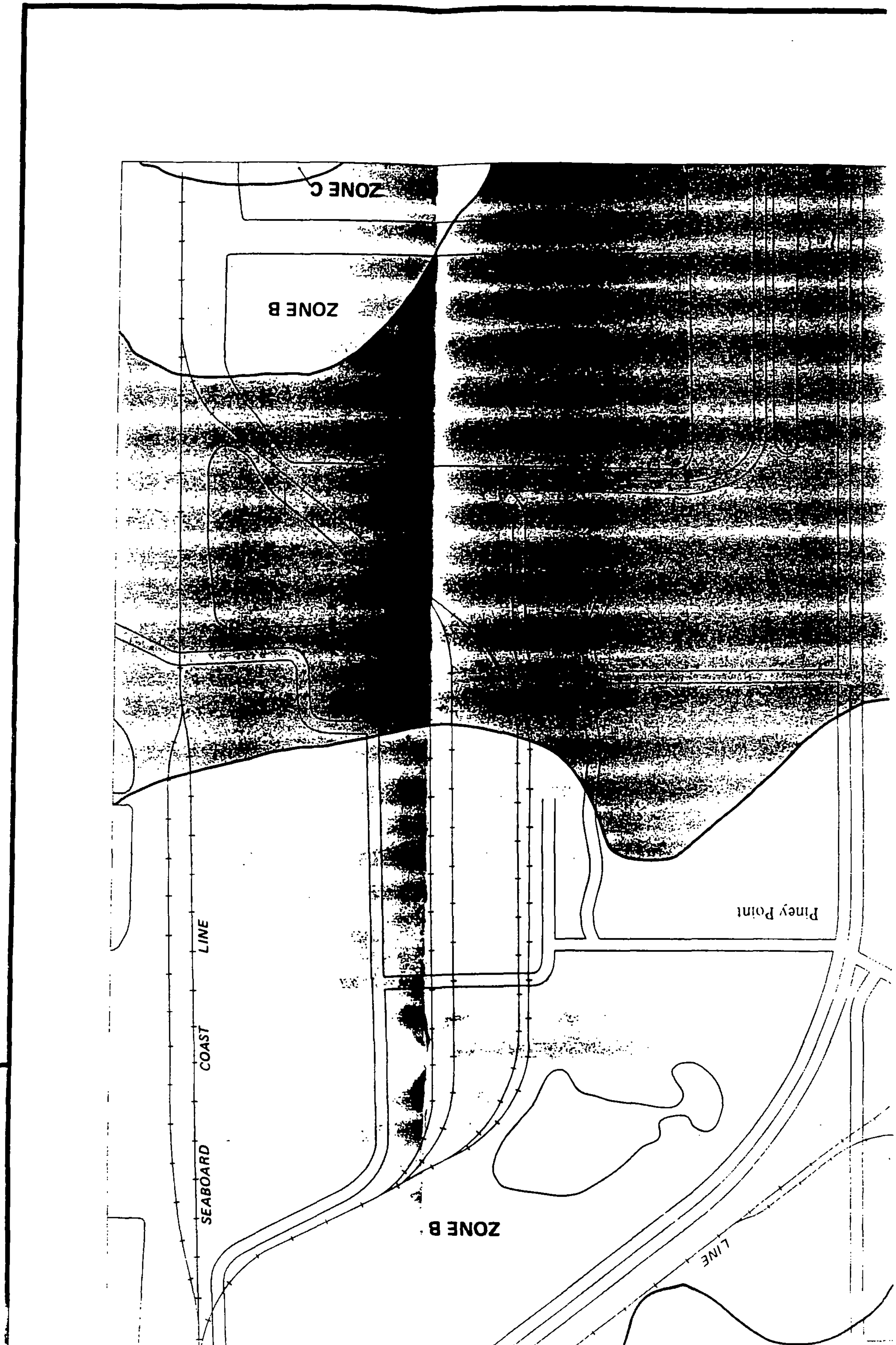
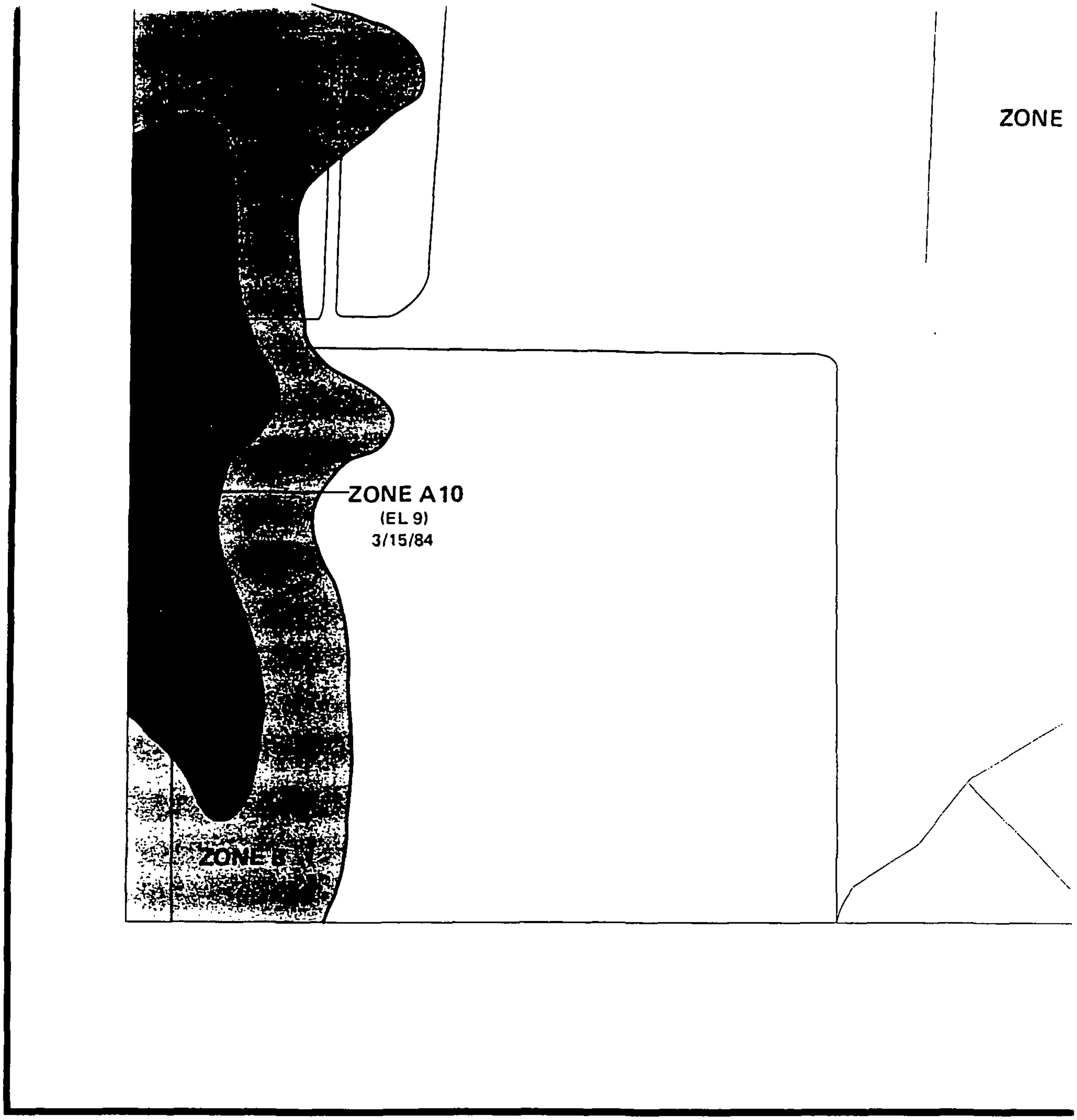
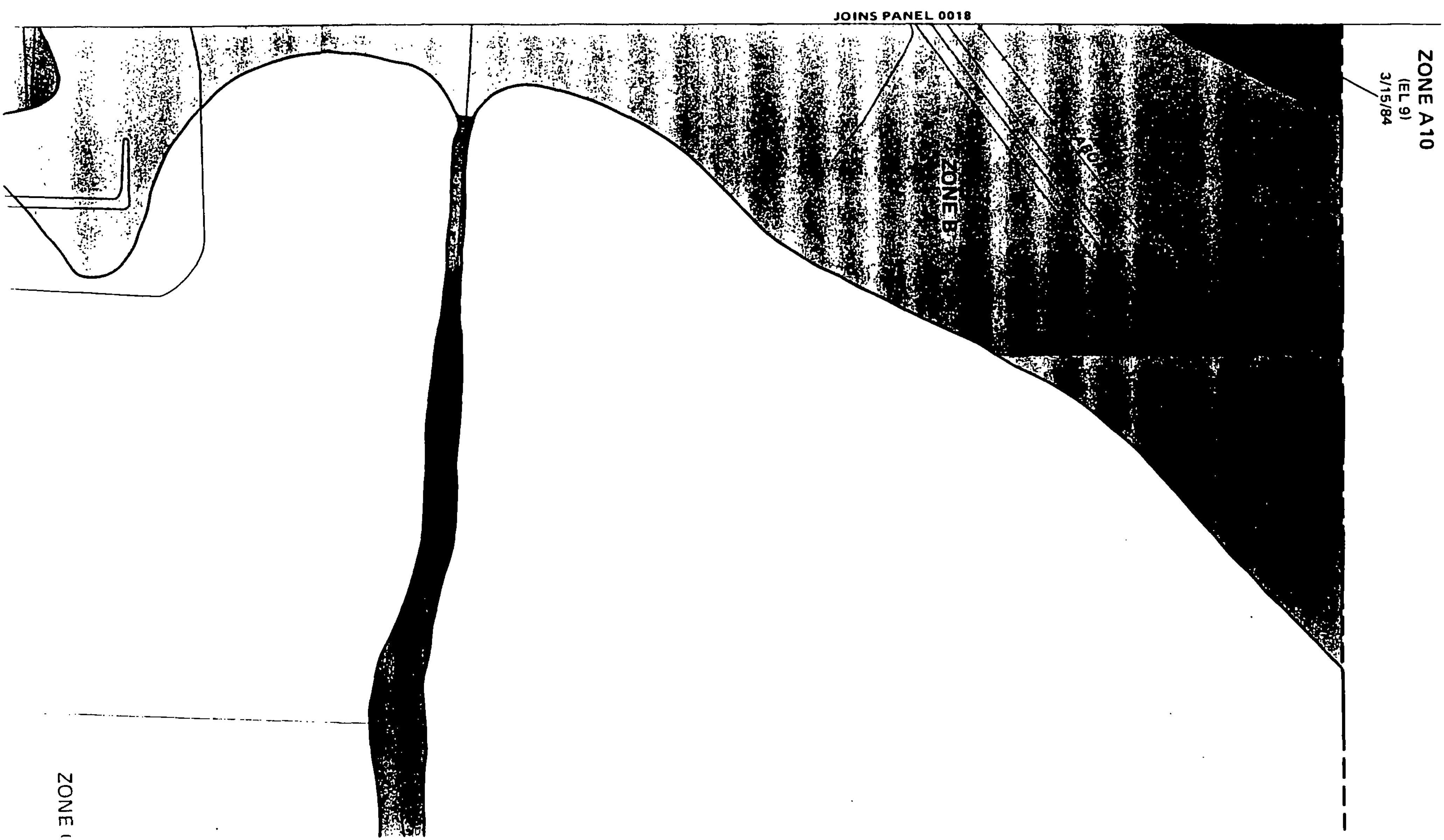


JOINS PANEL 0019


ZONE
ZONE A10
(EL 9)
3/15/84
ZONE B

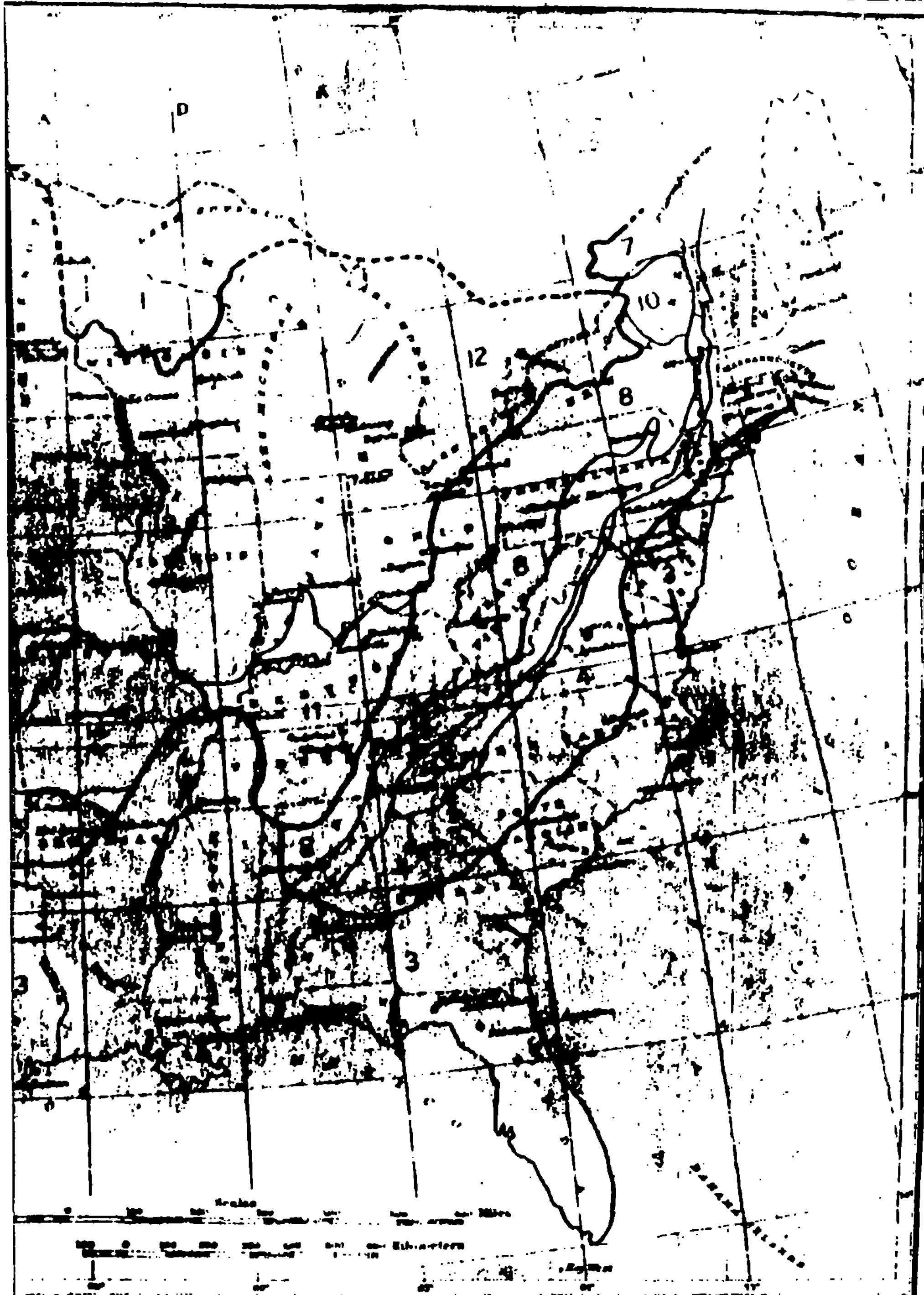

JOINS PANEL 0018
ZONE A10
(EL 9)
3/15/84
ZONE B
ZONE

currence of Ground Water
Jnited States

With a Discussion of Principles

By OSCAR EDWARD MEINZER

GEOLOGICAL WATER-SUPPLY PAPER 4[illegible]



PHYSIOGRAPHIC DIVISIONS

MAJOR DIVISION	PROVINCE
Laurentian Upland	1. Superior Upland
Atlantic Plain	2. Continental Shelf (submerged)
	3. Atlantic Coastal Pl
Appalachian Highlands	4. Piedmont province
	5. Blue Ridge provinc
	6. Appalachian Valley province
	7. St. Lawrence Valley
	8. Appalachian Plateau
	9. New England provin
	10. Adirondack province
Interior Plains	11. Interior Low Plateau
	12. Central Lowland
	13. Great Plains
Interior Highlands	14. Ozark Plateaus
	15. Ouachita province
Rocky Mountain region	16. Southern Rocky Mountains
	17. Wyoming Basin
	18. Northern Rocky Mountains
Intermontane Plateaus	19. Columbia Plateaus
	20. Colorado Plateaus
	21. Basin and Range province
Pacific Mountain region	22. Sierra Nevada and Cascade Mountains
	23. Pacific Border province
	24. Lower California province

HIC DIVISIONS AND PHYSIOGRAPHIC PROVINCES

rican Geographers, N. M. Fenneman, chairman

REFERENCE # 20

EPA-600/2-87-035
April 1987

DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Settings

by

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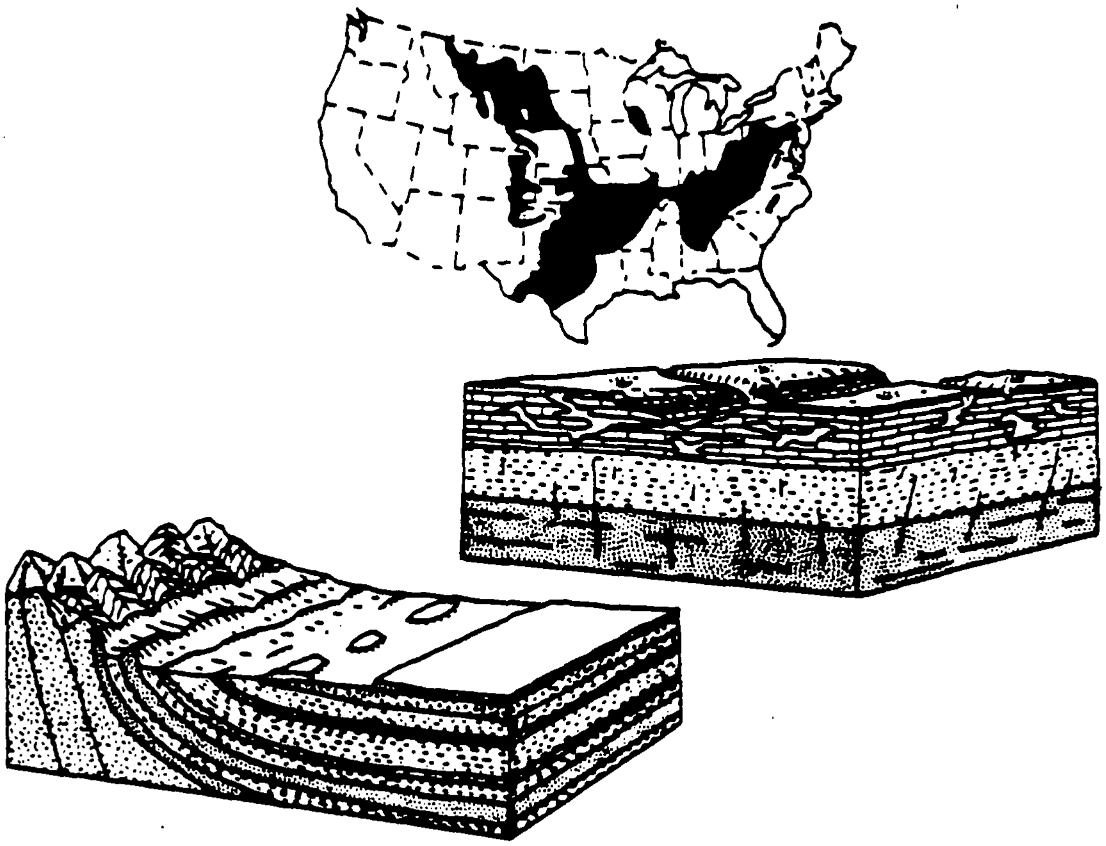
6. NONGLACIATED CENTRAL GROUND-WATER REGION



6A	Mountain Slopes
6B	Alluvial Mountain Valleys
6C	Mountain Flanks
6Da	Alternating Sandstone, Limestone and Shale - Thin Soil
6Db	Alternating Sandstone, Limestone and Shale - Deep Regolith
6E	Solution Limestone
6Fa	River Alluvium With Overbank Deposits
6Fb	River Alluvium Without Overbank Deposits
6G	Braided River Deposits
6H	Triassic Basins
6I	Swamp/Marsh
6J	Metamorphic/Igneous Domes and Fault Blocks
6K	Unconsolidated and Semi-consolidated Aquifers

6. NONGLACIATED CENTRAL REGION

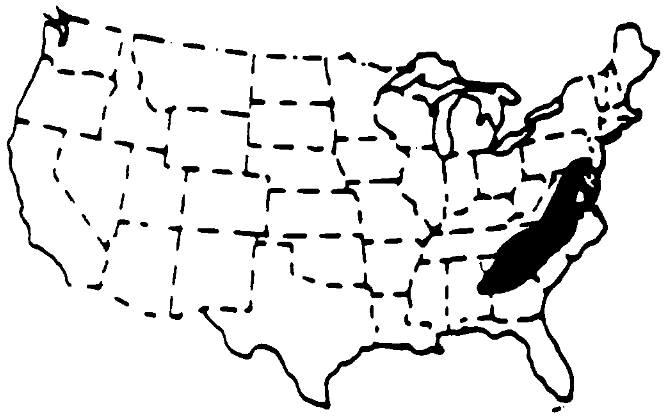
(Thin regolith over fractured sedimentary rocks)

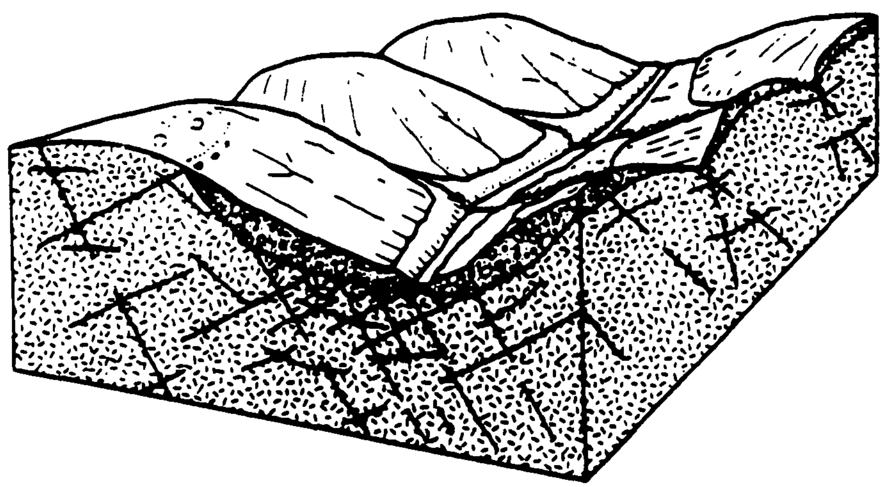
The nonglaciated Central region is an area of about 1,737,000 km^2 extending from the Appalachian Mountains on the east to the Rocky Mountains on the west. The part of the region in eastern Colorado and northeastern New Mexico is separated from the remainder of the region by the High Plains region. The Nonglaciated Central region also includes the Triassic Basins in Virginia and North Carolina and the "driftless" area in Wisconsin, Minnesota, Iowa, and Illinois where glacial deposits, if present, are thin and of no hydrologic importance. The region is a topographically complex area that ranges from the Valley and Ridge section of the Appalachian Mountains on the east westward across the Great Plains to the foot of the Rocky Mountains. It includes, among other hilly and mountainous areas, the Ozark Plateaus in Missouri and Arkansas. Altitudes range from 150 m above sea level in central Tennessee and Kentucky to 1,500 m along the western boundary of the region.

The region is also geologically complex. Most of it is underlain by consolidated sedimentary rocks that range in age from Paleozoic to Tertiary and consist largely of sandstone, shale, carbonate rocks (limestone and dolomite), and conglomerate. A small area in Texas and western Oklahoma is underlain by gypsum. Throughout most of the region the rock layers are horizontal or gently dipping. Principal exceptions are the Valley and Ridge section of the Wichita and Arbuckle Mountains in Oklahoma, and the Ouachita Mountains in Oklahoma and Arkansas, in all of which the rocks have been folded and extensively faulted. Around the Black Hills and along the eastern side of the Rocky Mountains the rock layers have been bent up sharply toward the mountains and truncated by erosion. The Triassic Basins in Virginia and North Carolina are underlain by moderate to gently dipping beds of shale and sandstone that have been extensively faulted and invaded by narrow bodies of igneous rock. These basins were formed in Triassic time when major faults in the crystalline rocks of the Piedmont resulted in the formation of structural depressions up to several thousand meters deep and more than 25 km wide and 140 km long.

The land surface in most of the region is underlain by regolith formed by chemical and mechanical breakdown of the bedrock. In the western part of the Great Plains the residual soils are overlain by or intermixed with eolian (wind-laid) deposits. The thickness and composition of the regolith depend on the composition and structure of the parent rock and on the climate, land cover, and topography. In areas underlain by relatively pure limestone, the regolith consists mostly of clay and is generally only a few meters thick. Where the limestones contain chert and in areas underlain by shale and sandstone, the regolith is thicker, up to 30 m or more in some areas. The

8. PIEDMONT BLUE RIDGE GROUND-WATER REGION





8A	Mountain Slopes
8B	Alluvial Mountain Valleys
8C	Mountain Flanks
8D	Regolith
8E	River Alluvium
8F	Mountain Crests
8G	Swamp/Marsh

8. PIEDMONT BLUE RIDGE REGION

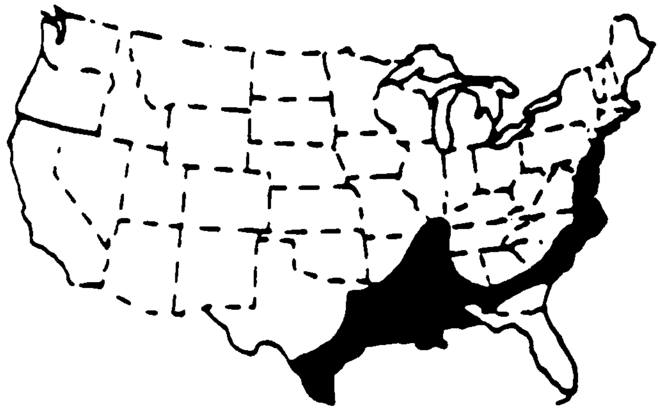
(Thick regolith over fractured crystalline and metamorphosed sedimentary rocks)

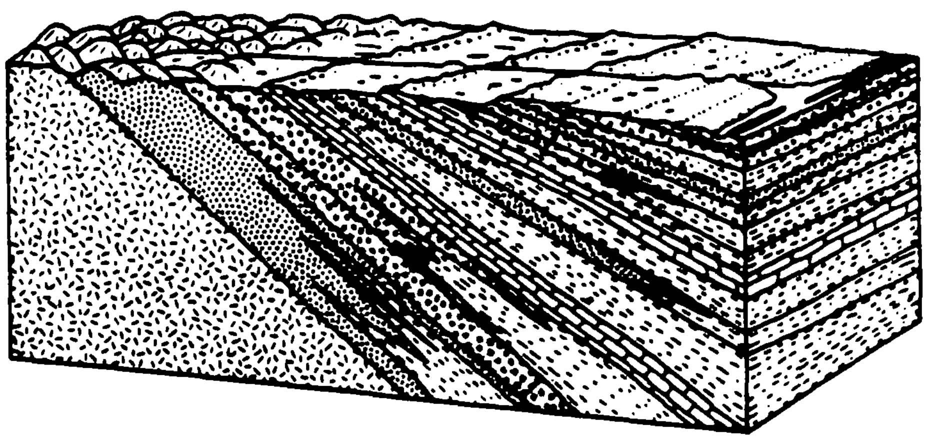
The Piedmont and Blue Ridge region is an area of about 247,000 km2 extending from Alabama on the south to Pennsylvania on the north. The Piedmont part of the region consists of low, rounded hills and long, rolling, northeast-southwest trending ridges whose summits range from about a hundred meters above sea level along its eastern boundary with the Coastal Plain to 500 to 600 m along its boundary with the Blue Ridge area to the west. The Blue Ridge is mountainous and includes the highest peaks east of the Mississippi. The mountains, some of which reach altitudes of more than 2,000 m, have smooth-rounded outlines and are bordered by well-graded streams flowing in relatively narrow valleys.

The Piedmont and Blue Ridge region is underlain by bedrock of Precambrian and Paleozoic age consisting of igneous and metamorphosed igneous and sedimentary rocks. These include granite, gneiss, schist, quartzite, slate, marble, and phyllite. The land surface in the Piedmont and Blue Ridge is underlain by clay-rich, unconsolidated material derived from in situ weathering of the underlying bedrock. This material, which averages about 10 to 20 m in thickness and may be as much as 100 m thick on some ridges, is referred to as saprolite. In many valleys, especially those of larger streams, flood plains are underlain by thin, moderately well-sorted alluvium deposited by the streams. When the distinction between saprolite and alluvium is not important, the term regolith is used to refer to the layer of unconsolidated deposits.

The regolith contains water in pore spaces between rock particles. The bedrock, on the other hand, does not have any significant intergranular porosity. It contains water, instead, in sheetlike openings formed along fractures (that is, breaks in the otherwise "solid" rock). The hydraulic conductivities of the regolith and the bedrock are similar and range from about 0.001 to 1 m day^{-1}. The major difference in their water-bearing characteristics is their porosities, that of regolith being about 20 to 30 percent and that of the bedrock about 0.01 to 2 percent. Small supplies of water adequate for domestic needs can be obtained from the regolith through large-diameter bored or dug wells. However, most wells, especially those where moderate supplies of water are needed, are relatively small in diameter and are cased through the regolith and finished with open holes in the bedrock. Although, as noted, the hydraulic conductivity of the bedrock is similar to that of the regolith, bedrock wells generally have much larger yields than regolith wells because, being deeper, they have a much larger availble drawdown.

10. ATLANTIC AND GULF COASTAL PLAIN GROUND-WATER REGION





10Aa	Regional Aquifers
10Ab	Unconsolidated & Semi-Consolidated Shallow Surficial Aquifer
10Ba	River Alluvium With Overbank Deposits
10Bb	River Alluvium Without Overbank Deposits
10C	Swamp

10. ATLANTIC AND GULF COASTAL PLAIN

(Complexly interbedded sand, silt, and clay)

The Atlantic and Gulf Coastal Plain region is an area of about 844,000 km^2 extending from Cape Cod, Massachusetts, on the north to the Rio Grande in Texas on the south. This Region does not include Florida and parts of the adjacent States; although those areas are a part of the Atlantic and Gulf Coastal Plain physiographic province, they together form a separate ground-water region. (See region 11, "Southeast Coastal Plain").

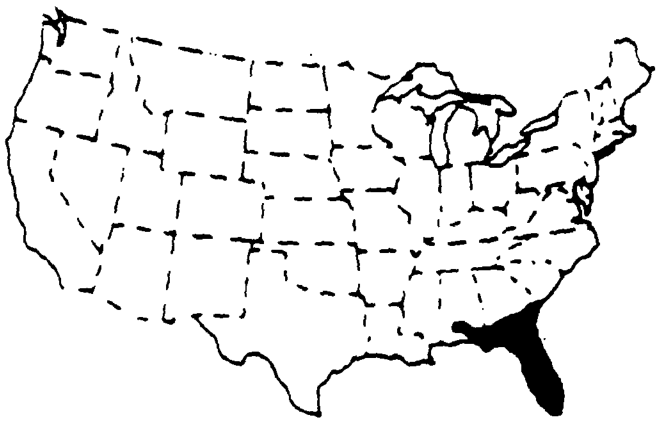
The Atlantic and Gulf Coastal Plain region ranges in width from a few kilometers near its northern end to nearly a thousand kilometers in the vicinity of the Mississippi River. The great width near the Mississippi reflects the effect of a major downwarped zone in the Earth's crust that extends from the Gulf of Mexico to about the confluence of the Mississippi and Ohio Rivers. This area is referred to as the Mississippi embayment.

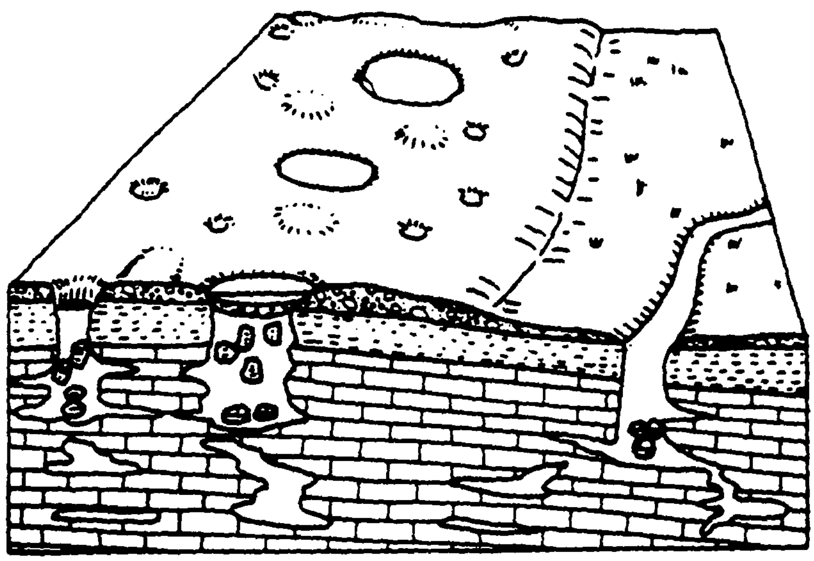
The topography of the region ranges from extensive, flat, coastal swamps and marshes 1 to 2 m above sea level to rolling uplands, 100 to 250 m above sea level, along the inner margin of the region.

The region is underlain by unconsolidated sediments that consist principally of sand, silt, and clay transported by streams from the adjoining uplands. These sediments, which range in age from Jurassic to the present, range in thickness from less than a meter near the inner edge of the region to more than 12,000 m in southern Louisiana. The greatest thicknesses are along the seaward edge of the region and along the axis of the Mississippi embayment. The sediments were deposited on floodplains and as deltas where streams reached the coast and, during different invasions of the region by the sea, were reworked by waves and ocean currents. Thus, the sediments are complexly interbedded to the extent that most of the named geologic units into which they have been divided contain layers of the different types of sediment that underlie the region. These named geologic units (or formations) dip toward the coast or toward the axis of the Mississippi embayment, with the result that those that crop out at the surface form a series of bands roughly parallel to the coast or to the axis of the embayment. The oldest formations crop out along the inner margin of the region, and the youngest crop out in the coastal area.

Within any formation the coarsest grained materials (sand, at places interbedded with thin gravel layers) tend to be most abundant near source areas. Clay and silt layers become thicker and more numerous downdip.

11. SOUTHEAST COASTAL PLAIN GROUND-WATER REGION





11A	Solution Limestone and Shallow Surficial Aquifers
11B	Coastal Deposits
11C	Swamp
11D	Beaches & Bars

11. SOUTHEAST COASTAL PLAIN

(Thick layers of sand and clay over semi-consolidated carbonate rocks)

The Southeast Coastal Plain is an area of about 212,000 km^2 in Alabama, Florida, Georgia, and South Carolina. It is a relatively flat, low-lying area in which altitudes range from sea level at the coast to about 100 m down the center of the Florida peninsula and as much as 200 m on hills in Georgia near the interior boundary of the region. Much of the area, including the Everglades in southern Florida, is a nearly flat plain less than 10 m above sea level.

The land surface of the Southeast Coastal Plain is underlain by unconsolidated deposits of Pleistocene age consisting of sand, gravel, clay, and shell beds and, in southeastern Florida, by semiconsolidated limestone. From the coast up to altitudes of nearly 100 m, the surficial deposits are associated with marine terraces formed when the Coastal Plain was inundated at different times by the sea. In most of the region the surficial deposits rest on formations, primarily of middle to late Miocene age, composed of interbedded clay, sand, and limestone. The most extensive Miocene deposit is the Hawthorn Formation. The formations of middle to late Miocene age and, where those formations are absent, the surficial deposits overlie semiconsolidated limestones and dolomites that are as much as 1,500 m thick. These carbonate rocks range in age from early Miocene to Paleocene and are generally referred to collectively as Tertiary limestones.

The Tertiary limestone that underlies the Southeast Coastal Plain constitutes one of the most productive aquifers in the United States and is the feature that justifies treatment of the region separately from the remainder of the Atlantic and Gulf Coastal Plain. The aquifer, which is known as the Floridan aquifer, underlies all of Florida and southeast Georgia and small areas in Alabama and South Carolina. The Floridan aquifer consists of layers several meters thick composed largely of loose aggregations of shells of foraminifers and fragments of echinoids and other marine organisms interbedded with much thinner layers of cemented and cherty limestone. The Floridan, one of the most productive aquifers in the world, is the principal source of ground-water supplies in the southeast Coastal Plain region.

In southern Florida, south of Lake Okeechobee, and in a belt about 30 km wide northward along the east coast of Florida to the vicinity of St. Augustine, the water in the Floridan aquifer contains more than 100 mg/l of chloride. In this area, most water supplies are obtained from surficial aquifers, the most notable of which underlies the southeastern part of Florida and which in the Miami area consists of 30 to 100 m of cavernous limestone and

United States
Department of
Agriculture

Soil
Conservation
Service

In Cooperation with
University of Florida,
Institute of Food and
Agricultural Sciences,
Agricultural Experiment
Stations and Soil Science
Department, and Florida
Department of Agriculture
and Consumer Services

REFERENCE # 21

Manatee County Florida

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was done prior to November 1952, when the soil survey program was administered by the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration. The first soil survey of Manatee County was issued in December 1958. In 1980, the soils were recorrelated, and data were revised and updated for this soil survey. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service and the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations and Soil Science Department, and the Florida Department of Agriculture and Consumer Services. It is part of the technical assistance furnished to the Manatee River Soil and Water Conservation District. The Manatee County Board of Commissioners contributed financially to this soil survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Many of the soils in Manatee County are used for crop production. The main crops are citrus and tomatoes.

contents

soil series

Issued April 1983

these soils have a spodic horizon. EauGallie, Myakka, Wabasso, and Wauchula soils are poorly drained, and Pomello soils are moderately well drained. Cassia, Pomello, and Zolfo soils have a spodic horizon and are sandy to a depth of 80 inches or more.

Typical pedon of Braden fine sand, in woodland, about 2 miles southwest of Lorraine and three-fourths of a mile south of Florida Highway 70, NW1/4SW1/4 sec. 21, T. 35 S., R. 19 E.

A1—0 to 4 inches; very dark gray (10YR 3/1) rubbed fine sand; weak fine granular structure; very friable; common fine roots; very strongly acid; clear smooth boundary.

A21—4 to 6 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; common fine roots; very strongly acid; clear wavy boundary.

A22—6 to 10 inches; brown (10YR 5/3) fine sand; single grained; loose; few fine roots; very strongly acid; clear wavy boundary.

A23—10 to 18 inches; dark brown (10YR 4/3) fine sand; single grained; loose; few fine roots; strongly acid; clear wavy boundary.

A24—18 to 24 inches; light yellowish brown (10YR 6/4) fine sand; common fine faint very pale brown mottles; single grained; loose; very strongly acid; gradual wavy boundary.

B1—24 to 28 inches; yellow (10YR 7/6) fine sand; common fine distinct strong brown (7.5YR 5/6) segregated iron mottles; single grained; loose; very strongly acid; clear wavy boundary.

B21t—28 to 36 inches; yellowish brown (10YR 5/8) fine sandy loam; common fine and medium distinct light gray (10YR 7/1; 7/2) and common fine faint strong brown and yellowish red mottles; weak coarse subangular blocky structure; friable; sand grains bridged and coated with clay; extremely acid; gradual wavy boundary.

B22t—36 to 40 inches; yellowish brown (10YR 5/8) fine sandy loam; many medium distinct light gray (10YR 7/2) and common fine faint strong brown and yellowish red mottles; weak coarse subangular blocky structure; friable; sand grains coated and bridged with clay; few thin lenses of loamy fine sand; extremely acid; gradual wavy boundary.

B3—40 to 44 inches; very pale brown (10YR 7/4) loamy fine sand; many medium distinct light gray (10YR 7/2) and many fine faint strong brown mottles; moderate medium granular structure; very friable; extremely acid; clear wavy boundary.

C1g—44 to 50 inches; light gray (10YR 7/2) fine sand; few fine distinct brownish yellow (10YR 6/8) mottles; single grained; loose; extremely acid; gradual wavy boundary.

C2g—50 to 55 inches; light brownish gray (10YR 6/2) fine sand; few medium faint light gray (10YR 7/2) mottles; single grained; loose; clear wavy boundary.

C3g—55 to 70 inches; gray (10YR 5/1) sand; many coarse distinct light gray (10YR 7/2) mottles; single grained; loose; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is very strongly acid or strongly acid. The Bt and C horizons range from extremely acid to strongly acid.

The A1, or Ap, horizon has hue of 10YR, value of 2, and chroma of 1 or value of 3 or 4 and chroma of 1 to 3. It is less than 10 inches thick where value is 3 or less and chroma is 2 or 1.

The A21 horizon has hue of 10YR, value of 5 to 7, and chroma of 2. The A22 to A24 horizons have hue of 10YR, value of 5 or 6, and chroma of 3 to 6; or value of 4 and chroma of 3 or 4; or value of 7 and chroma of 3 or 4. In some pedons there are few to common mottles or splotches of uncoated sand grains that have chroma of 2 or 1. The A horizon is sand or fine sand. There is no A21 horizon in some pedons.

The B1 horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 4 to 8. It is sand, fine sand, loamy sand, or loamy fine sand. There is no B1 horizon in some pedons.

The B2t horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 8; or hue of 7.5YR, value of 5, and chroma of 4 or 6; or value of 6 and chroma of 4 to 8 and few to many mottles that have chroma of 2 or less. There are mottles of higher value and chroma in many pedons. The horizon is sandy loam, fine sandy loam, or sandy clay loam. In some pedons there are a few streaks or lenses of coarser textured material. The mottles that have chroma of 2 are at a depth of less than 30 inches. They indicate wetness.

In some pedons the lower part of the B2t horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or 1; or hue of 2.5Y, value of 4 to 7, and chroma of 2; or hue of 5Y, value of 5 or 6, and chroma of 1; or it has no hue (N), value is 4 to 7, and in some pedons, there are mottles of red, yellow, brown, or gray. The texture is sandy loam, fine sandy loam, or sandy clay loam.

The B3 horizon has hue, value, and chroma that are similar to those of the B2t horizon. It ranges from fine sandy loam to loamy sand. There is no B3 horizon in some pedons.

The Cg horizon has hue, value, and chroma similar to those of the lower part of the B2t horizon. It is sand or fine sand.

Bradenton series

The Bradenton series consists of poorly drained, moderately permeable soils that formed in unconsolidated loamy marine sediment underlain by marl and, in some places, hard limestone. The soils are nearly level and are on low-lying ridges and hammocks. Slopes are generally smooth and are less than 2 percent. In most years, if the soils are not drained, the water table is within 10 inches of the surface for 2 to 6 months out of the year and at a depth of 10 to 40 inches for much of the rest of the year. In dry periods the water table recedes to a depth below 40 inches. These soils are coarse-loamy, siliceous, hyperthermic Typic Ochraqualfs.

Bradenton soils are near Chobee, Delray, EauGallie, Felda, Floridana, Manatee, Wabasso, and Waveland soils. Chobee soils are fine-loamy. Delray and Floridana soils have a mollic epipedon and an A horizon that is more than 20 inches thick. EauGallie, Wabasso, and Waveland soils have a spodic horizon. Felda soils have an A horizon that is 20 to 40 inches thick. Manatee soils have a mollic epipedon.

Typical pedon of Bradenton fine sand, in a hardwood-cabbage palm hammock, about one-eighth mile east of the Sarasota County line along the north boundary of the Myakka River State Park, SW1/4NW1/4 sec. 6, T. 37 S., R. 21 E.

A1—0 to 4 inches; dark gray (10YR 4/1) fine sand; moderate medium granular structure; very friable; many fine and medium roots; medium acid; clear smooth boundary.

A2—4 to 9 inches; grayish brown (10YR 5/2) fine sand; few medium distinct dark gray (10YR 4/1) mottles; single grained; loose; many fine and medium roots; medium acid; abrupt wavy boundary.

B21tg—9 to 20 inches; dark gray (10YR 4/1) fine sandy loam; common fine and medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few thin discontinuous clay films on surface of peds; slightly acid; gradual wavy boundary.

B22tg—20 to 27 inches; gray (10YR 5/1) fine sandy loam; many fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few thin discontinuous clay films on surface of peds; common soft white calcium carbonate accumulations; mildly alkaline; gradual wavy boundary.

B3g—27 to 38 inches; gray (10YR 5/1) loamy fine sand; weak coarse subangular blocky structure; very friable; many sand grains coated with white calcium carbonate, few white calcium carbonate nodules; mildly alkaline, calcareous; clear wavy boundary.

C—38 to 80 inches; light gray (10YR 7/1) marl that has texture of loamy fine sand; massive; friable; moderately alkaline, calcareous.

The solum ranges from 20 to 50 inches in thickness.

The A1, or Ap, horizon has hue of 10YR, value of 2 to 4, and chroma of 1; or it has no hue (N) and value of 2 to 4. It ranges from medium acid to neutral and ranges from 4 to 6 inches in thickness.

The A2 horizon has hue of 10YR, value of 4 to 7, and chroma of 1; or value of 5 to 7 and chroma of 2; or it has no hue (N) and value of 4 to 7 and mottles of gray, brown, or yellow. Reaction ranges from medium acid to neutral. The total thickness of the A horizon is less than 20 inches.

The B2tg horizon has hue of 10YR, value of 4 to 7, and chroma of 1; or hue of 10YR or 2.5Y, value of 3 to 7, and chroma of 2; or it has no hue (N) and value of 4 to 7 and, in places, mottles of brown, yellow, or red. The horizon is sandy loam or fine sandy loam, and it ranges from slightly acid to mildly alkaline. In many pedons the lower part of the horizon has soft calcium carbonate accumulations and nodules. The B3g horizon is similar in color to the B2tg horizon. It is loamy sand or loamy fine sand and is mildly alkaline or moderately alkaline. In some places there is no B3g horizon.

The C horizon has hue of 10YR to 5GY, value of 5 to 8, and chroma of 2 or 1. It is predominantly marl that has texture of loamy sand or loamy fine sand. However, in some pedons the C horizon is a mixture of shells, shell fragments, and sand.

In some pedons a layer of limestone about 1.5 to 3 feet thick underlies the Btg, B3g, or C horizons at a depth between 40 and 80 inches. The limestone can be dug with a backhoe. It has few to common solution holes or fractures. Below the limestone there is variable sand to sandy clay loam mixed with shells and shell fragments.

Broward Variant

Broward Variant soils are poorly drained and moderately permeable. They formed in sandy marine sediment overlying limestone. These soils are nearly level and are in moderately large to small areas of flatwoods, mainly in the western part of the county. Slopes are 0 to 2 percent. In most years, if the soils are not drained, the water table is between depths of 10 and 40 inches for more than 6 months of the year. It is at a depth of less than 10 inches for 1 to 4 months in wet seasons and recedes to a depth below 40 inches in very dry seasons. These soils are sandy, siliceous, hyperthermic Entic Haplaquods.

Broward Variant soils are near Chobee, Delray, EauGallie, Myakka, and Wabasso Variant soils. All the associated soils except Wabasso Variant soils do not have limestone within a depth of 80 inches. Chobee and Delray soils have a mollic epipedon, do not have a spodic horizon, and have an argillic horizon. EauGallie soils have an argillic horizon below a depth of 40 inches. Myakka soils have a spodic horizon that is better developed than that of Broward Variant soils. Wabasso Variant soils have an argillic horizon between the spodic horizon and limestone.

Typical pedon of Broward Variant fine sand, in a partly cleared area, about 2 miles west of Oneco and about 1,000 feet north of 53rd Ave., SW1/4SW1/4 sec. 11, T. 35 S., R. 17 E.

B22tca—24 to 44 inches; very dark gray (10YR 3/1) sandy clay loam; weak coarse subangular blocky structure; friable; sticky and plastic; few fine roots; many soft white calcium carbonate accumulations; sand grains coated and bridged with clay; moderately alkaline, calcareous; gradual wavy boundary.

B23tca—44 to 51 inches; dark gray (10YR 4/1) sandy clay loam; few fine distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; friable; sticky and plastic; sand grains coated and bridged with clay; many fine and medium white calcium carbonate accumulations; moderately alkaline, calcareous; gradual wavy boundary.

B3g—51 to 63 inches; gray (10YR 5/1) fine sandy loam; common medium distinct yellowish brown (10YR 5/4) mottles; massive; friable; common calcium carbonate nodules; moderately alkaline, calcareous; gradual wavy boundary.

Cg—63 to 80 inches; gray (10YR 6/1) loamy fine sand and fine sand; massive; very friable; few small calcium carbonate nodules; moderately alkaline, calcareous.

The solum is more than 40 inches thick.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Reaction ranges from slightly acid to moderately alkaline. Thickness ranges from 4 to 18 inches.

The B2t and B2tca horizons have no hue (N) or have hue of 10YR; value is 2 through 5, and chroma is 1 or 0; or they have hue of 5YR, value of 4 through 6, and chroma of 1 or 2 and, in some pedons, mottles of gray or brown; or they have hue of 2.5Y, value of 4 or 5, and chroma of 2 and mottles. Texture is sandy loam or sandy clay loam. Clay content in the upper 20 inches of the argillic horizon ranges from 18 to 35 percent. In the Btca horizon, reaction ranges from neutral to moderately alkaline and calcareous.

The B3g horizon has the same color range as the B2t and B2tca horizons. Its texture is sandy loam or fine sand loam. The horizon has pockets or lenses of coarser material in some places.

The Cg horizon has hue of 10YR, value of 5 through 7, and chroma of 1; hue of 2.5Y, value of 5 through 7 and chroma of 2; hue of 5Y, value of 5 through 7, and chroma of 1 or 2; or hue of 5GY, value of 5 or 6, and chroma of 1 and, in some pedons, mottles. Its texture ranges from fine sand or loamy fine sand to clay loam. Reaction ranges from neutral to moderately alkaline and calcareous. There are shell fragments in some pedons.

Chobee Variant

Chobee Variant soils are very poorly drained, slowly permeable soils that formed in thick beds of alkaline loamy marine sediment. These soils are nearly level and are in shallow depressions mainly in the western part of the county. The water table is at a depth of less than 10 inches for 6 months or more of the year. Undrained areas pond for long periods. Slopes range from 0 to 2 percent. These soils are fine-loamy, carbonatic, hyperthermic Typic Haplaquolls.

Chobee Variant soils are near Bradenton, Chobee, Felda, and Manatee soils. Bradenton soils do not have a mollic epipedon and are poorly drained. Chobee soils have an argillic horizon. Felda soils are poorly drained and have an argillic horizon below a depth of 20 inches. Manatee soils have a sandy loam argillic horizon.

Typical profile of Chobee Variant sandy clay loam, in a wooded area, 100 feet east of Cedar Drain and one-half mile south of Atlantic Coast Line Railroad, SE1/4NE1/4 sec. 28, T. 33 S., R. 18 E.

A11—0 to 13 inches; black (10YR 2/1) sandy clay loam; weak medium subangular blocky structure; firm; high in organic matter; few fine and medium roots; neutral; clear wavy boundary.

A12—13 to 20 inches; very dark gray (10YR 3/1) sandy clay loam; weak medium subangular blocky structure; common fine faint very dark grayish brown mottles; firm; few fine and medium roots; neutral; clear wavy boundary.

B2gca—20 to 35 inches; light gray (10YR 7/2) sandy clay loam; common fine distinct dark gray (10YR 4/1) mottles; moderate medium subangular blocky structure; sticky; soft accumulations of calcium carbonate; moderately alkaline, calcareous; clear wavy boundary.

B3gca—35 to 40 inches; light gray sandy loam; common medium distinct yellow (10YR 7/6) mottles; weak fine subangular blocky structure; slightly sticky; soft accumulations of calcium carbonate; moderately alkaline, calcareous; clear wavy boundary.

C1g—40 to 70 inches; light gray (10YR 7/2) loamy sand; weak medium granular structure; few fine shell fragments; very friable; moderately alkaline, calcareous; clear wavy boundary.

C2g—70 to 80 inches; mixed light gray (10YR 7/2) and brownish yellow (10YR 6/6) sand; single grained; loose; common shell fragments; moderately alkaline, calcareous.

The solum ranges from 35 to 60 inches in thickness. Base saturation is 50 percent or more in all horizons. The mollic epipedon is 10 to 24 inches thick.

The A horizon has no hue (N) or has hue of 10YR; value is 2 or 3, and chroma is 1 or 0. Reaction ranges from medium acid to neutral.

The Bgca horizon has no hue (N) or has hue of 10YR; value is 5 to 7, and chroma is 2 to 0. The texture is mainly sandy clay loam or sandy clay but ranges to sandy loam in the lower part. The content of clay in the

10- to 40-inch control section averages 20 to 35 percent. Reaction is mildly alkaline or moderately alkaline. There are few to common mottles in shades of yellow or brown.

The Cg horizon has no hue (N) or has hue of 10YR; value is 5 to 7, and chroma is 2 to 0. The texture is sand or loamy sand. Carbonatic accumulations are common in some pedons. Shell fragments range from few to common.

Delray series

The Delray series consists of very poorly drained soils that formed in marine sandy and loamy material. Permeability is moderate or moderately rapid. The soils are nearly level and are in low shallow depressions. In most years, if the soils are not drained, the water table is at or slightly above the surface for more than 6 months of the year. Slopes are less than 2 percent. These soils are loamy, mixed, hyperthermic Grossarenic Argiaquolls.

Delray soils are near Bradenton, Felda, Floridana, EauGallie, Manatee, Myakka, Ona, Pomona, and Waveland soils. Bradenton soils do not have a mollic epipedon but have an argillic horizon at a depth of less than 20 inches. Felda soils do not have a mollic epipedon but have an argillic horizon at a depth between 20 and 40 inches. Floridana soils have an argillic horizon at a depth between 20 and 40 inches. Manatee soils have an argillic horizon at a depth of less than 20 inches. EauGallie, Myakka, Ona, Pomona, and Waveland soils have a spodic horizon and are better drained than Delray soils.

Typical pedon of Delray mucky loamy fine sand, in a wooded area, about 2.5 miles east of the Sarasota County line and 0.75 mile south of Florida Highway 18, NW1/4NE1/4 sec. 16, T. 37 S., R. 21 E.

A11—0 to 8 inches; black (N 2/0) mucky loamy fine sand; weak medium granular structure; very friable; common fine and medium roots; neutral; gradual smooth boundary.

A12—8 to 16 inches; black (10YR 2/1) loamy fine sand; few fine faint dark gray mottles; weak medium granular structure; very friable; many fine roots; neutral; clear wavy boundary.

A21—16 to 21 inches; grayish brown (10YR 5/2) fine sand; common medium distinct very dark gray (10YR 3/1) streaks and mottles; single grained; loose; common fine and few medium roots; neutral; clear wavy boundary.

A22—21 to 43 inches; light brownish gray (10YR 6/2) fine sand; common medium distinct dark gray (10YR 4/1) mottles and very dark gray (10YR 3/1) streaks along old root channels; single grained; loose; common fine and few medium roots; neutral; clear wavy boundary.

A23—43 to 48 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine roots; neutral; clear wavy boundary.

B21tg—48 to 51 inches; grayish brown (2.5Y 5/2) fine sandy loam; weak medium subangular blocky structure; friable; sand grains coated and bridged with clay; few fine roots; mildly alkaline; clear wavy boundary.

B22tg—51 to 66 inches; grayish brown (2.5Y 5/2) sandy clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few clay films on ped surfaces; neutral; gradual wavy boundary.

B23tg—66 to 75 inches; greenish gray (5GY 6/1) sandy clay loam; common medium distinct olive brown (2.5Y 4/4) mottles; moderate medium subangular blocky structure; firm; clay films on ped surfaces; neutral; clear wavy boundary.

B24tg—75 to 80 inches; grayish brown (2.5Y 5/2) sandy clay loam; few fine faint light gray mottles; weak medium subangular blocky structure; firm; few clay films on ped surfaces; common fine sand lenses between peds; neutral.

Reaction ranges from medium acid to neutral in the A horizon and from neutral to mildly alkaline in the Btg horizon.

The A1 horizon has hue of 10YR, value of 3 or less, and chroma of 2 or 1; or it has no hue (N) and value of 2 or 3. The content of organic matter ranges from about 2 to 18 percent. The horizon ranges from 10 to 24 inches in thickness.

The A2 horizon has hue of 10YR or 2.5YR, value of 4 to 7, and chroma of 2; or it has hue of 10YR, value of 4 to 7, and chroma of 1; or it has no hue (N) and value of 4 to 7. The texture is fine sand or sand. The horizon ranges from 27 to 55 inches in thickness.

The B2tg horizon has hue of 10YR to 5GY, value of 4 to 6, and chroma of 1; or hue of 10YR, value of 4 to 6, and chroma of 2; or it has no hue (N), and value is 4 to 6. It has mottles of brown, yellow, or olive in some pedons. Its texture is fine sandy loam or sandy clay loam.

The B3g horizon is similar in color to the B2tg horizon. Its texture is loamy sand or loamy fine sand. There is no B3g horizon in some pedons.

Duette series

The Duette series consists of moderately well drained soils that formed in thick deposits of marine sand. Permeability is moderately rapid. The soils are nearly level to gently sloping and are on low ridges and knolls in flatwoods. In most years, if the soils are not drained, the water table is at a depth of 48 to 72 inches for 1 to 4 months during the wet season. It is at a depth of more than 72 inches for the rest of the year. Slopes range from 0 to 5 percent. These soils are sandy, siliceous, hyperthermic Grossarenic Entic Haplohumods.

Duette soils are near Cassia, Myakka, and Pomello soils. Cassia and Myakka soils have a spodic horizon at a depth of less than 30 inches. Cassia soils are somewhat poorly drained, and Myakka soils are poorly drained. Pomello soils have a spodic horizon at a depth between 30 and 50 inches.

Typical pedon of Duette fine sand, 0 to 5 percent slopes, in an area of sand scrub, approximately 2.25 miles east of the northeast corner of the Myakka River State Park, SW1/4SW1/4SW1/4 sec. 3, T. 37 S., R. 21 E.

A1—0 to 4 inches; very dark gray (10YR 3/1) rubbed, salt and pepper appearance unrubbed, fine sand; weak fine granular structure; friable; many fine and medium roots; strongly acid; clear smooth boundary.

A21—4 to 12 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine and coarse roots; slightly acid; clear smooth boundary.

A22—12 to 58 inches; white (10YR 8/1) fine sand; single grained; loose; few fine and coarse roots; slightly acid; clear smooth boundary.

B21h—58 to 64 inches; dark brown (7.5YR 3/2) fine sand; weak medium subangular blocky structure; friable; sand grains well coated with organic matter; few fine roots; strongly acid; clear wavy boundary.

B22h—64 to 80 inches; black (5YR 2/1) fine sand; weak medium subangular blocky structure; friable; many fine and medium roots; strongly acid.

Reaction ranges from slightly acid to strongly acid throughout. Texture is sand or fine sand in all horizons.

The A1 horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. Unrubbed material has a salt and pepper appearance. Thickness ranges from 2 to 6 inches.

The A2 horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2. Combined thickness of the A1 and A2 horizons ranges from 51 to 75 inches.

The Bh horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2 or 3, and chroma of 1 to 4.

EauGallie series

The EauGallie series consists of poorly drained soils that formed in thick beds of sandy and loamy marine sediment. Permeability is moderate to moderately rapid. The soils are nearly level and are in broad areas of flatwoods and, in some places, in slightly depressed areas. In most years, a water table is at a depth of less than 10 inches for 2 to 4 months in wet seasons and at a depth of less than 40 inches for more than 6 months of the year. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

EauGallie soils are near Delray, Pinellas, and Wabasso soils. Delray soils are very poorly drained, have a mollic epipedon, and do not have a spodic horizon. Pinellas soils do not have a spodic horizon. Wabasso soils have an argillic horizon at a lesser depth.

Typical pedon of EauGallie fine sand, in a pasture, about 2.5 miles west of Foxleigh and 3.25 miles southeast of the Manatee River, SW1/4NE1/4 sec. 26, T. 34 S., R. 18 E.

Ap—0 to 5 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine roots; mixture of light gray sand grains and black organic matter granules; very strongly acid; gradual wavy boundary.

A21—5 to 12 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine roots; very strongly acid; gradual wavy boundary.

A22—12 to 28 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; few fine roots; few medium distinct grayish brown (10YR 5/2) mottles; very strongly acid; abrupt wavy boundary.

B2h—28 to 42 inches; black (5YR 2/1) fine sand; massive in place, crushes to moderate medium granular structure; friable sand grains coated with organic matter; few fine roots; very strongly acid; clear wavy boundary.

B2tg—42 to 50 inches; grayish brown (2.5Y 5/2) sandy clay loam; moderate medium subangular blocky structure; firm and slightly sticky; few fine roots; sand grains coated and bridged with clay; slightly acid; gradual wavy boundary.

C—50 to 65 inches; mixed lenses and pockets of grayish brown (10YR 5/2) fine sand, loamy fine sand, and fine sandy loam; massive; friable; few pockets of grayish brown (2.5Y 5/2) sandy clay loam; slightly acid.

The solum is more than 46 inches thick. The A horizon is less than 30 inches thick. The Btg horizon is at a depth of more than 40 inches. The A and Bh horizons are sand or fine sand.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1. It ranges from 3 to 9 inches in thickness. The A2 horizon has hue of 10YR, value of 5 to 8, and chroma of 2 or 1. The A horizon is very strongly or strongly acid.

The B2h horizon has no hue (N) and value of 2; or hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; or hue of 5YR and 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 3, and chroma of 3. The sand grains are coated with organic matter. Reaction ranges from very strongly acid to slightly acid. The B3 horizon has hue of 10YR, value of 3 to 6, and chroma of 3. It consists of sand or fine sand. It is commonly below the Bh horizon. The A'2 horizon has hue of 10YR, value of 4 or 5, and chroma of 1; or hue of 10YR or 2.5Y, value of

5 or 6, and chroma of 2. There is no A'2 horizon in some pedons.

The B2tg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 1. In some pedons it has mottles in shades of brown, yellow, or gray. Its texture is sandy loam or sandy clay loam. There are pockets of sand or loamy sand. Reaction is medium acid to mildly alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 1. In some pedons it has mottles in shades of yellow or brown. Its texture is fine sand, loamy fine sand, or sandy loam. The horizon has pockets of finer textured material in some pedons. Reaction is slightly acid to mildy alkaline.

Estero series

The Estero series consists of very poorly drained soils that formed in thick deposits of sandy marine sediment under conditions favorable for the accumulation of organic material. Permeability is moderately rapid. These soils are nearly level and are in tidal mangrove swamps. Slopes are less than 1 percent. These soils are flooded daily by high tides. The water table is above the surface or just below the surface, depending on the tide. These soils are sandy, siliceous, hyperthermic Typic Haplaquods.

Estero soils are near Wulfert and Kesson soils in tidal swamps and Myakka, Delray, Bradenton, and St. Johns soils on uplands. Wulfert soils are organic. Kesson soils do not have a spodic horizon. Myakka, Delray, Bradenton, and St. Johns soils do not have a histic epipedon. Delray soils have a mollic epipedon, do not have a spodic horizon, and have an argillic horizon. Bradenton soils do not have a spodic horizon but have an argillic horizon. St. Johns soils have an umbric epipedon.

Typical pedon of Estero muck, in a mangrove swamp, on Perico Island, SW1/4SE1/4 sec. 27, R. 16 E., T. 34 S.

Oa—0 to 6 inches; black (10YR 2/1) muck; about 90 percent fiber, less than 10 percent rubbed; massive; friable; neutral; abrupt smooth boundary.

A11—6 to 11 inches; black (N 2/0) fine sand; weak fine granular structure; very friable; many fine roots; moderately alkaline; clear smooth boundary.

A12—11 to 14 inches; very dark gray (10YR 3/1) fine sand; weak fine granular structure; very friable; many fine roots; moderately alkaline; clear wavy boundary.

A21—14 to 20 inches; light brownish gray (10YR 6/2) fine sand; few fine distinct yellowish red (5YR 5/8) mottles; single grained; loose; few fine roots; moderately alkaline; clear wavy boundary.

A22—20 to 31 inches; grayish brown (10YR 5/2) fine sand; few medium distinct yellowish red (5YR 5/6) mottles; single grained; loose; few very fine roots; mildly alkaline; abrupt wavy boundary.

B21h—31 to 41 inches; black (5YR 2/1) and dark grayish brown (10YR 4/2) fine sand; massive; very friable; sand grains thinly coated with organic matter; very strongly acid; clear wavy boundary.

B22h—41 to 46 inches; black (10YR 2/1) and dark reddish brown (5YR 3/2) fine sand; massive; very friable; sand grains thinly coated with organic matter; very strongly acid; gradual wavy boundary.

B3—46 to 56 inches; dark brown (10YR 4/3) and black (10YR 2/1) fine sand; massive; very friable; very strongly acid; clear wavy boundary.

C—56 to 80 inches; grayish brown (10YR 5/2) fine sand; few fine distinct black (10YR 2/1) mottles; single grained; loose; very strongly acid.

Reaction in the Oa and A horizons ranges from neutral to moderately alkaline by field test and from very strongly acid to mildly alkaline after drying. The Bh horizon is strongly acid or very strongly acid. Conductivity of the saturation extract ranges from about 245 to 350 mmho/cm in the Oa horizon and from 15 to 45 mmho/cm in the mineral horizons.

The Oa or Oe horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. In pedons where the Oa or Oe horizon is less than 10 inches thick, there is a histic epipedon if the soil is mixed to a depth of 10 inches.

The A1 horizon has hue of 10YR, value of 2, and chroma of 1; or value of 3 or 4 and chroma of 1 or 2; or hue of 2.5Y, value of 3 or 4, and chroma of 2; or it has no hue (N), and value is 2 to 4. Where value is 3 or less and chroma is 2 or 1, it is less than 10 inches thick even after mixing with the Oa or Oe horizon to a depth of 10 inches. The texture is sand, fine sand, mucky sand, or mucky fine sand.

The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2 and, in some pedons, has brown, yellow, red, or gray mottles and streaks. Its texture is sand or fine sand.

The Bh horizon has hue of 10YR, value of 2, and chroma of 1; or value of 3 and chroma of 1 or 2; or hue of 7.5YR, value of 3, and chroma of 2; or hue of 5YR, value of 2, and chroma 1 or 2; or value of 3 and chroma of 1 to 4. The B21h horizon does not have colors of higher chroma, as described, in all pedons. Texture is sand, fine sand, or loamy fine sand. There are few to common uncoated sand grains in the upper part of the horizon.

The B3 horizon has hue of 10YR, value of 3, and chroma of 3; or value of 4 and chroma of 2 to 4; or hue of 7.5YR and 5YR, value of 4, and chroma of 2 or 4. Its texture is sand or fine sand.

but in places extends throughout the horizon as small bodies of uncemented fine sand. The B&Bh horizon is 18 to 43 inches thick.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 4. It extends to a depth of 80 inches or more.

Palmetto series

The Palmetto series consists of deep, poorly drained soils that formed in thick deposits of sand and loamy marine sediment. Permeability is moderately slow. The soils are nearly level. They are in the flatwoods in sloughs, in poorly defined drainageways, and in depressions. Slopes are less than 2 percent. In most years, if the soils are not drained, the water table is at a depth of 10 inches for 2 to 6 months of the year. In depressions water is ponded for 2 to 6 months of the year. These soils are loamy, siliceous, hyperthermic Grossarenic Paleaquults.

Palmetto soils are near Delray, EauGallie, Wabasso, and Waveland soils. Delray soils have a mollic epipedon and are sandy to a depth of 80 inches or more. EauGallie, Wabasso, and Waveland soils have a spodic horizon. A part of the spodic horizon in Waveland soils is ortstein.

Typical pedon of Palmetto sand, about 2.25 miles north of Verna, SW1/4SW1/4 sec. 24, T. 35 S., R. 20 E.

A11—0 to 8 inches; black (10YR 2/1) sand; moderate medium granular structure; very friable; many fine roots; extremely acid; clear wavy boundary.

A12—8 to 10 inches; dark gray (10YR 4/1) sand; common medium distinct gray (10YR 5/1) mottles; single grained; loose; common fine roots; extremely acid; gradual wavy boundary.

A2—10 to 25 inches; gray (10YR 6/1) sand; common medium distinct gray (10YR 5/1) and light gray (10YR 7/1) mottles; single grained; loose; few fine roots; extremely acid; clear wavy boundary.

Bh&A2—25 to 30 inches; dark grayish brown (10YR 4/2) sand; many coarse distinct gray (10YR 5/1) mottles consisting of material from the A2 horizon and common medium distinct very dark grayish brown (10YR 3/2) Bh fragments; single grained; loose; many uncoated sand grains; extremely acid; gradual wavy boundary.

B21h—30 to 40 inches; dark grayish brown (10YR 4/2) sand; common medium faint very dark grayish brown (10YR 3/2) mottles; single grained; loose; many uncoated sand grains; extremely acid; gradual wavy boundary.

B22h—40 to 45 inches; very dark grayish brown (10YR 3/2) sand; common coarse faint dark grayish brown (10YR 4/2) mottles; single grained; loose; many uncoated sand grains; extremely acid; clear wavy boundary.

B21tg—45 to 60 inches; grayish brown (2.5Y 5/2) sandy clay loam; few medium distinct yellowish brown (10YR 5/6) and few coarse faint dark grayish brown mottles; weak coarse subangular blocky structure; friable; sand grains moderately coated and bridged with clay; very strongly acid; gradual wavy boundary.

B22tg—60 to 64 inches; dark grayish brown (2.5Y 4/2) sandy loam; common coarse faint grayish brown (2.5Y 5/2) mottles; weak coarse subangular blocky structure; friable; sand grains moderately coated and bridged with clay; very strongly acid; gradual wavy boundary.

B3g—64 to 68 inches; dark grayish brown (2.5Y 4/2) loamy sand; massive; friable; very strongly acid.

The B'2tg horizon is at a depth of more than 40 inches. The A and Bh horizons are extremely acid to strongly acid. The B2t, B3g, and Cg horizons are very strongly acid or strongly acid.

The A1, or Ap, horizon has hue of 10YR, value of 1 to 4, and chroma of 2 or 1; or it has no hue (N), and value is 1 to 4. It is as much as 8 inches thick where value is 2 or 3. Its texture is sand or fine sand.

The A2 horizon has no hue (N) or has hue of 10YR or 2.5Y; value is 5 to 7, chroma is 2 to 0, and there are mottles in some pedons; or value is 5, chroma is 2, and there are mottles. Its texture is sand or fine sand.

The Bh&A2 horizon has the same colors as those of the component horizons. There is no Bh&A2 horizon in some pedons.

The B2h horizon does not meet the requirements of a spodic horizon. It mainly has hue of 10YR, value of 3, and chroma of 2 or 3 or value of 4 and chroma of 2 to 4; or hue of 7.5YR, value of 4, and chroma of 2 or 4; but it ranges to hue of 10YR, value of 5, and chroma of 2 to 4 where the A2 horizon has value of 7. Uncoated sand grains in the B2h horizon are common to many. The horizon is sand or fine sand.

The A'2 horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or less. Its texture is sand or fine sand. There is no A'2 horizon in some pedons.

The B2tg or B'2tg horizon has hue of 10YR or 5Y, value of 4 to 7, and chroma of 1 or 2; or hue of 2.5Y, value of 4 to 7, and chroma of 1 or 2; or hue of 2.5Y, value of 4 to 7, and chroma of 2; or it has no hue (N) and value of 4 to 7, and, in some pedons, mottles of yellow, brown, red, or gray. The control section is sandy loam or sandy clay loam. In some pedons the lower B2tg horizon is sandy clay.

The B3 or B'3g horizon has the same color range as that of the B2tg horizon. It ranges from loamy sand to fine sandy loam.

The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 8, and chroma of 4 or less. It ranges from sand to loamy fine sand. There is no Cg horizon in some pedons.

yellow mottles in lower 2 inches of horizon; weak medium granular structure; loose; common fine and coarse roots; few fine scattered carbon particles; dark brown staining along root channels; strongly acid; gradual wavy boundary.

C3—34 to 56 inches; yellowish brown (10YR 5/6) fine sand; weak medium granular structure; loose; few coarse roots; few fine faint gray splotches; sand grains lightly coated; very strongly acid; gradual wavy boundary.

C4—56 to 76 inches; very pale brown (10YR 7/3) fine sand; common fine and medium distinct strong brown (7.5YR 5/6) mottles; weak medium granular structure; loose; few coarse roots; many uncoated sand grains; strongly acid; gradual wavy boundary.

C5—76 to 86 inches; white (10YR 8/1) fine sand; few fine faint yellowish brown and very pale brown mottles; single grained; loose; few coarse roots; strongly acid.

These soils are fine sand to a depth of 80 inches or more. Reaction ranges from very strongly acid to medium acid in all horizons. The content of silt and clay in the 10- to 40-inch control section is less than 5 percent.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2 or value of 5 and chroma of 1; or hue of 2.5Y, value of 3 or 4, and chroma of 2. It is 3 to 8 inches thick.

The C horizon in the upper part has hue of 10YR, value of 6 or 7, and chroma of 3 or 4 or value of 5 and chroma of 2 to 8. In the lower part it has hue of 10YR, value of 6, and chroma of 1 to 3 or value of 7 and chroma of 1 to 4 or value of 8 and chroma of 1 or 2. In the lower part there are brown, yellow, or red mottles. In some pedons, large splotches or mottles that have chroma of 2 or 1 are within a depth of 40 inches. The colors are those of the sand grains and are not indicative of wetness.

The lower part of the C horizon, in pedons on benches along the larger streams and rivers, is at a depth of more than 40 inches; it is extremely hard (iron-cemented) sand or fine sand. It has hue of 10YR, value of 5 to 7, and chroma of 3 to 8.

Tomoka series

The Tomoka series consists of very poorly drained soils that formed in well decomposed organic material and in the underlying sandy and loamy mineral material. Permeability is moderate to moderately rapid. The soils are nearly level. They are in freshwater marshes. Slopes are less than 2 percent. In undrained areas the water table is at or above the surface except during extended dry periods. These soils are loamy, siliceous, dysic, hyperthermic Terric Medisaprists.

Tomoka soils are near Bradenton, Delray, Felda, and Floridana soils. All the associated soils are mineral soils and except for the Delray and Floridana soils are better drained than the Tomoka soils.

Typical pedon of Tomoka muck, about 5 miles southwest of Myakka City and 0.25 mile south of Cason Lake, NW1/4NW1/4 sec. 29, T. 36 S., R. 21 E.

Oa1—0 to 12 inches; black (5YR 2/1) muck; moderate medium granular structure; friable; extremely acid; gradual wavy boundary.

Oa2—12 to 18 inches; dark reddish brown (5YR 3/2) muck; moderate medium granular structure; friable; extremely acid; gradual wavy boundary.

Oa3—18 to 25 inches; black (5YR 2/1) muck; moderate medium granular structure; friable; extremely acid; gradual wavy boundary.

Oa4—25 to 28 inches; black (5YR 2/1) muck; common coarse distinct gray (10YR 5/1) sand lenses; moderate medium granular structure; friable; extremely acid; clear wavy boundary.

IIC1—28 to 32 inches; dark gray (10YR 4/1) and light brownish gray (10YR 6/2) sand; single grained; loose; strongly acid; clear wavy boundary.

IIC2—32 to 35 inches; black (10YR 2/1) sand and loamy sand; single grained; loose; medium acid; abrupt wavy boundary.

IIIC3—35 to 40 inches; gray (10YR 5/1) sandy clay loam; many fine and medium distinct very dark gray (10YR 3/1) and light gray (10YR 6/1) mottles and streaks of sand; massive; friable; slightly acid; gradual wavy boundary.

IIIC4—40 to 50 inches; gray (10YR 5/1) sandy clay loam; massive; friable; slightly acid; gradual wavy boundary.

IIIC5—50 to 75 inches; gray (10YR 5/1) sandy clay loam with common light gray (10YR 6/1) sand pockets and lenses; massive; friable; neutral.

Reaction of the Oa horizon is less than 4.5 in 0.01*M* CaCl2 and from 5.5 to 6.5 in field test. The IIC and IIIC horizons range from very strongly acid to neutral.

The Oa horizon has hue of 10YR or 5YR, value of 2, and chroma of 1 or 2; hue of 5YR, value of 3, and chroma of 2 or 3; or no hue (N) and value of 2. It ranges from 16 to 40 inches in thickness.

The IIC horizon has hue of 10YR or 2.5Y, value of 2 to 6, and chroma of 2 or 1. It ranges from sand to loamy fine sand. The IIIC horizon has hue of 10YR or 2.5Y, value of 2 to 7, and chroma of 2 or 1. It is sandy loam, fine sandy loam, or sandy clay loam. In many pedons there are lenses and pockets of finer or coarser textured material in the lower IIIC horizons.

Wabasso series

The Wabasso series consists of poorly drained, slowly permeable to very slowly permeable soils that formed in sandy and loamy marine sediment. The soils are nearly level. They are in areas of low, broad flatwoods on flood plains. In most years, if the soils are not drained, the water table is at a depth of 10 to 40 inches for more than 6 months of the year. It is at a depth of less than 10 inches for less than 60 days in wet seasons and is at a depth of more than 40 inches in very dry seasons. In some areas on flood plains, the soils are flooded frequently, and in other areas they are flooded only rarely. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, hyperthermic Alfic Haplaquods.

Wabasso soils are near Bradenton, limestone substratum, Delray, EauGallie, Felda, Floridana, and Palmetto soils. Bradenton, limestone substratum, soils do not have a sandy surface layer that is more than 20 inches thick or a spodic horizon. Delray and Floridana soils have a mollic epipedon, do not have a spodic horizon, and are in depressions. EauGallie soils have an argillic horizon at a depth between 40 and 80 inches. Felda soils do not have a spodic horizon. EauGallie and Felda soils are in the same positions on the landscape as Wabasso soils. Palmetto soils do not have a spodic horizon and are in poorly defined drainageways and sloughs.

Typical pedon of Wabasso fine sand, in an improved pasture, 1 mile north of Florida Highway 64, 1 mile southwest of Manatee River, NW1/4NW1/4 sec. 25, T. 34 S., R. 18 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) fine sand; mixture of organic matter and light gray sand grains has a salt and pepper appearance; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

A21—7 to 12 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine and medium roots; common uncoated sand grains; strongly acid; clear smooth boundary.

A22—12 to 21 inches; light gray (10YR 7/1) fine sand; single grained; loose; medium vertical dark gray and very dark gray streaks in the matrix and along root channels; few medium roots; very strongly acid; abrupt wavy boundary.

B21h—21 to 25 inches; black (5YR 2/1) fine sand; massive parting to moderate fine granular; sand grains are well coated with organic matter; few fine roots; very strongly acid; clear wavy boundary.

B22h—25 to 28 inches; dark reddish brown (5YR 2/2) fine sand; massive parting to weak fine granular; firm; few fine and medium roots; many sand grains coated with organic matter; very strongly acid; clear wavy boundary.

B3—28 to 31 inches; brown (10YR 4/3) fine sand; few medium faint very dark brown streaks and mottles; single grained; loose; many sand grains are thinly coated with organic matter; very strongly acid; gradual wavy boundary.

A'2—31 to 37 inches; pale brown (10YR 6/3) fine sand; few fine faint streaks of very dark grayish brown; single grained; loose; medium acid; gradual wavy boundary.

B'21t—37 to 46 inches; grayish brown (10YR 5/2) sandy loam; few medium prominent red (2.5YR 4/8) and distinct brownish yellow (10YR 6/8) mottles; weak fine granular structure; friable; sand grains are bridged and coated with clay; few fine light gray (10YR 7/1) sand lenses; slightly acid; gradual wavy boundary.

B'22t—46 to 65 inches; gray (10YR 6/1) sandy clay loam; few coarse distinct reddish yellow (7.5YR 6/6), strong brown (7.5YR 5/8), and dark brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; firm; sand grains are distinctly coated and bridged with clay; few thin patchy clay films on ped faces and in root channels; slightly acid; gradual wavy boundary.

Cg—65 to 80 inches; gray (10YR 6/1) sand mixed with many fine shell fragments; brownish yellow and strong brown mottles; single grained; mildly alkaline.

Reaction ranges from neutral to very strongly acid in the A, B2h, and B3 horizons and from medium acid to mildly alkaline in the horizons below.

The Ap, or A1, horizon has no hue (N) or has hue of 10YR; value is 2 or 3, and chroma is 1 or 2. It generally has a salt and pepper appearance where undisturbed. It ranges from 3 to 8 inches in thickness. The A2 horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Total thickness of the A horizon is 16 to 30 inches.

The B2h horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 3 or less. It is 7 to 18 inches thick.

The B3 horizon has hue of 5YR to 10YR, value of 4, and chroma of 2 to 4. It is fine sand or sand and ranges to 6 inches in thickness. The B3&Bh horizon, where present, has matrix colors similar to those of the B3 horizon and also has black or dark reddish brown weakly cemented Bh fragments.

The A'2 horizon has no hue (N) or has hue of 10YR or 2.5Y; value is 5 to 8, and chroma is 3 or less. It is fine sand or sand and ranges to 14 inches in thickness.

The B'2t horizon has hue of 10YR, 2.5Y, and 5Y, value of 4 to 7, and chroma of 1 to 8. It has gray, brown, yellow, and red mottles. It is fine sandy loam, sandy loam, or sandy clay loam. In some pedons there are few to common, fine and medium nodules of white (10YR 8/1) carbonatic material. The B'2t horizon is at a depth between 26 and 40 inches. It is 15 to 30 inches thick.

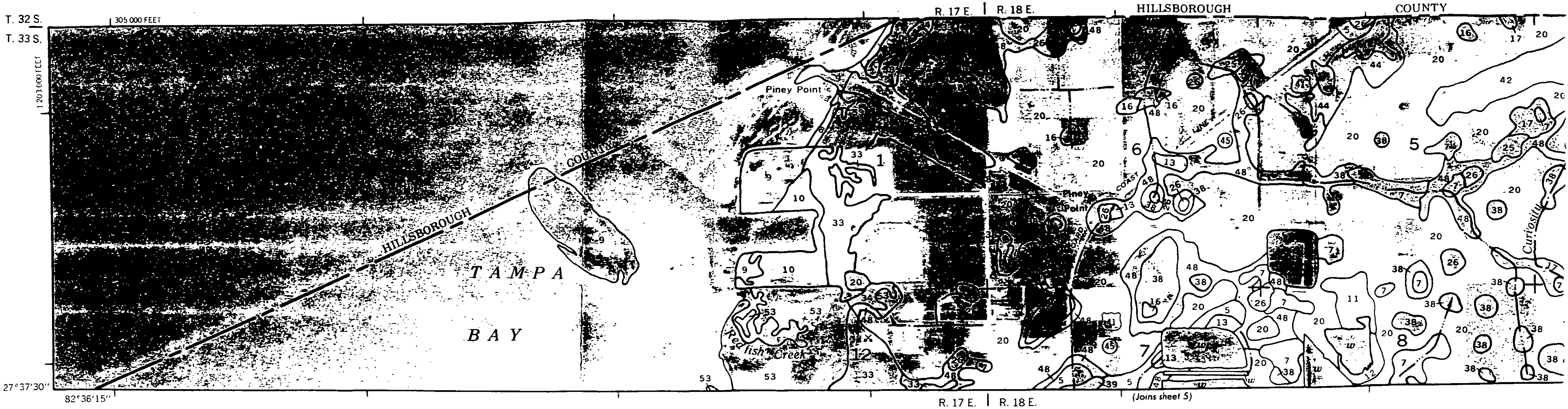
The Cg horizon has no hue (N) or has hue of 10YR; value is 5 to 7, and chroma is 1 or 0. It is a mixture of sand or loamy sand and shell fragments.

Wabasso Variant

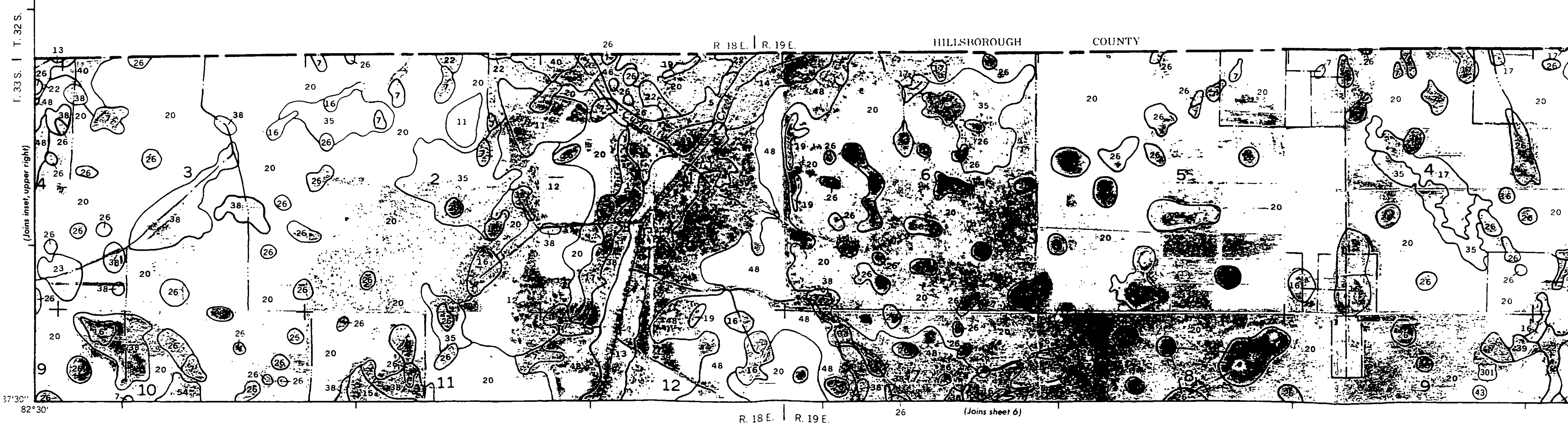
Wabasso Variant soils are poorly drained. They formed in sandy and loamy marine sediment overlying limestone. Permeability is slow to moderately slow. The soils are nearly level. They are in areas of low, broad flatwoods. Slopes are 0 to 2 percent. In most years, if the soils are


82°30'
T. 32 S.
T. 33 S.
27°38'30"
R. 17 E. | R. 18 E.
HILLSBOROUGH COUNTY
TAMPA BAY
Piney Point
Redfish Creek
Curiosity Creek
SEABOARD COAST LINE
(Joins sheet 5)
(Joins lower left sheet 1)
1 198 000 FEET
335 000 FEET
R. 18 E. | R. 19 E.
T. 33 S. | T. 32 S.
(Joins sheet 6)
(Joins sheet 2)
375 000 FEET
1 200 000 FEET
5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet
N

Sheet #1



Sheet #1



5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

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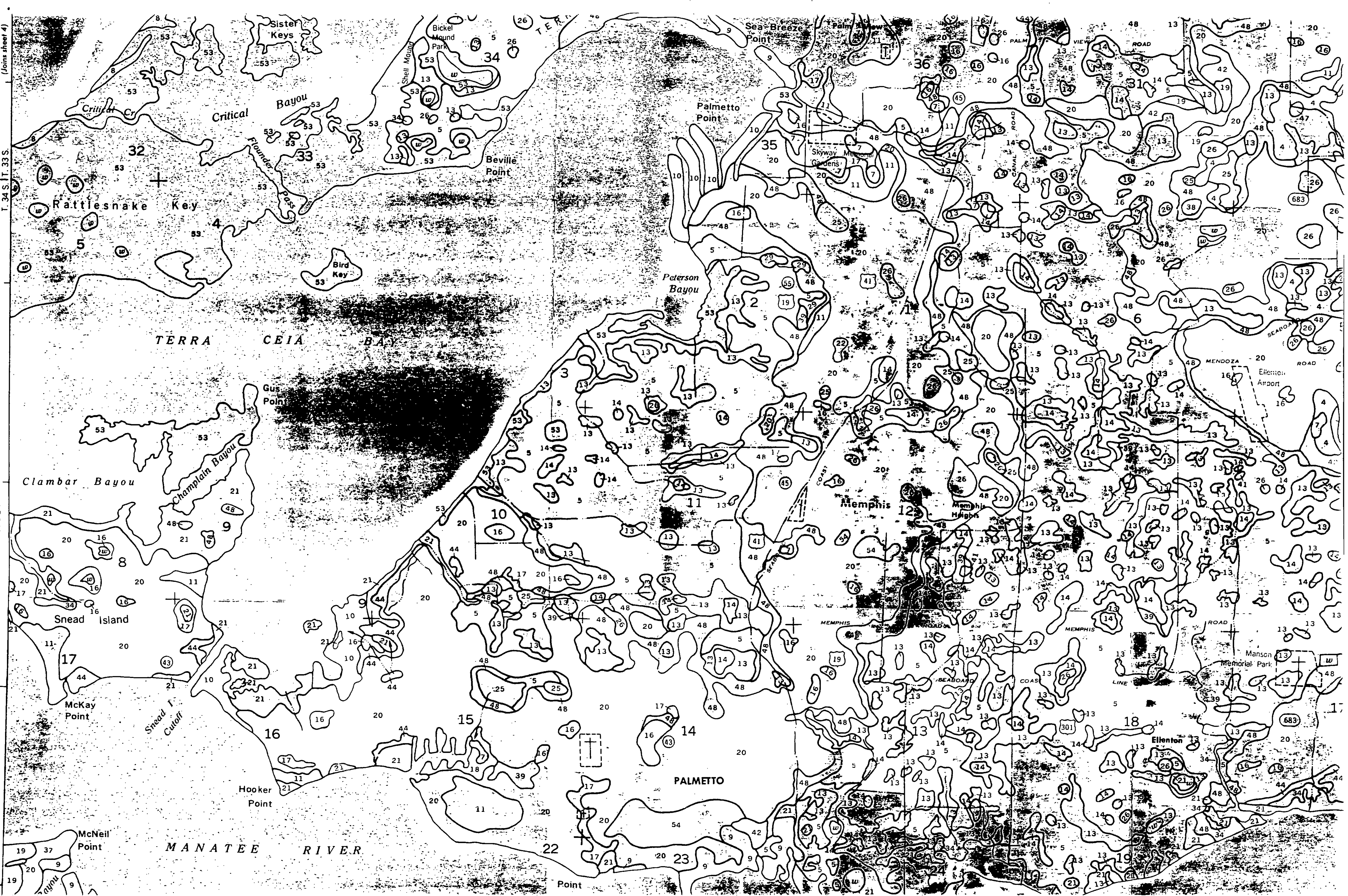
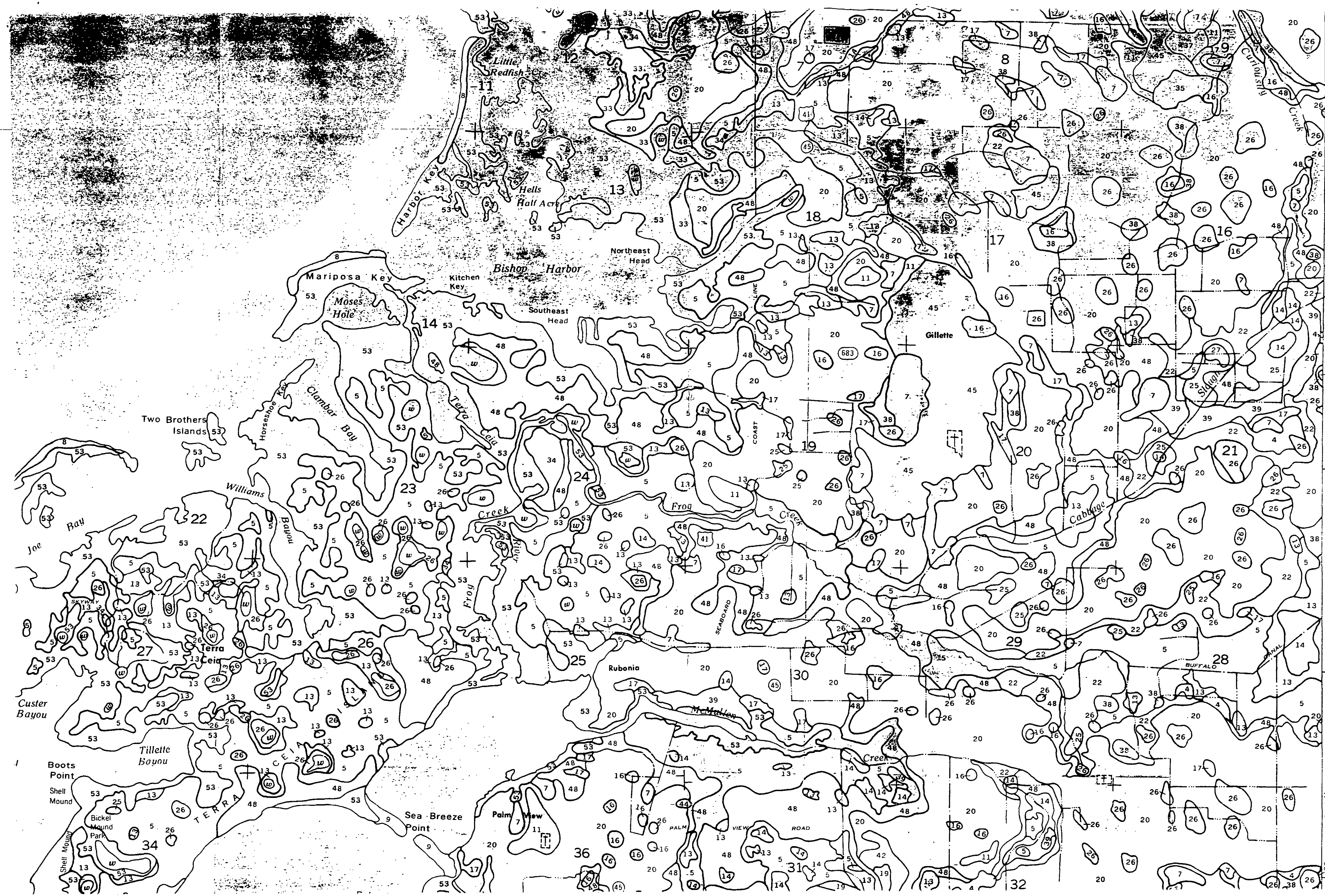
N

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1979

Sheet #5

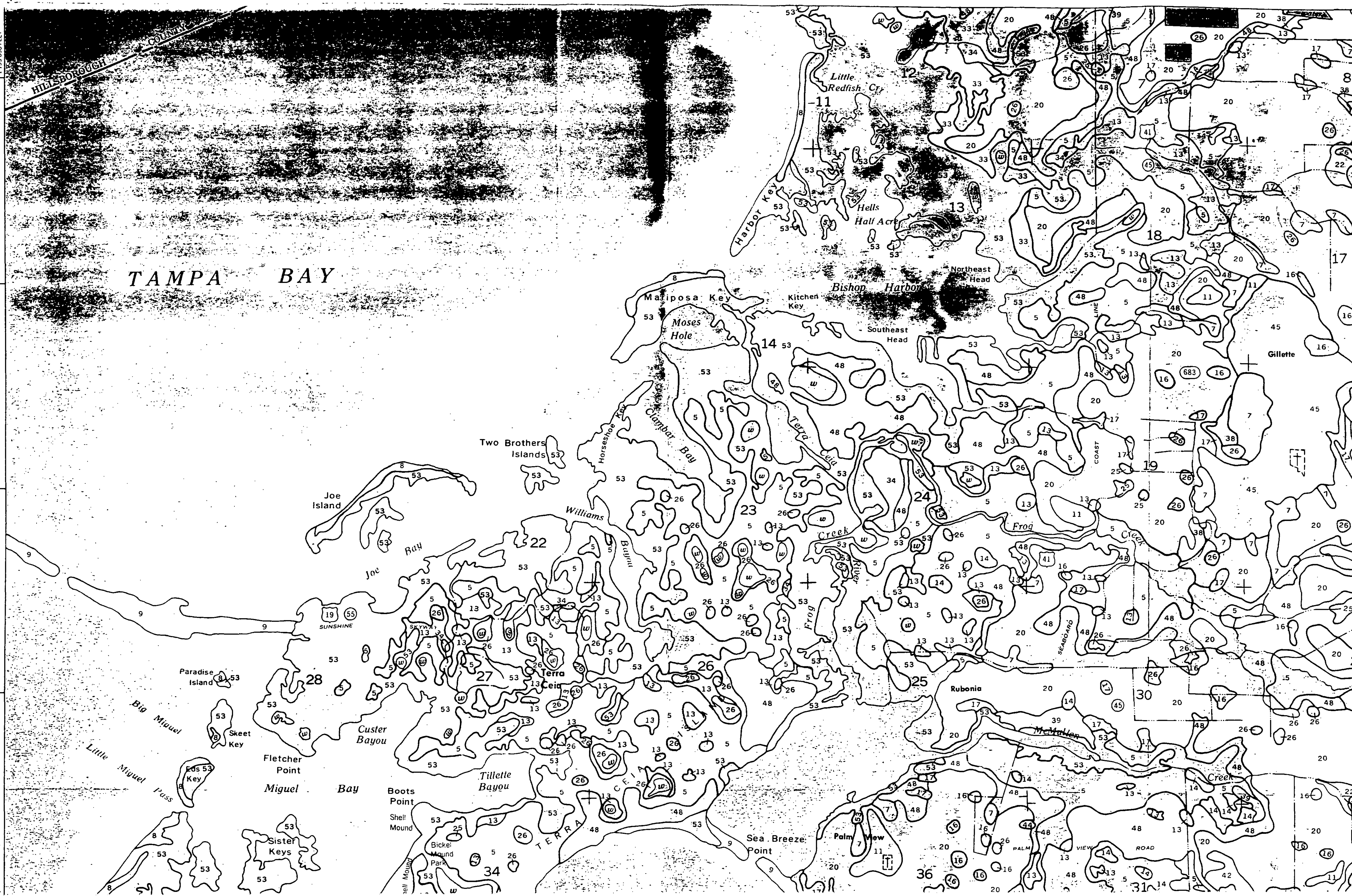

(Joins sheet 4)
T. 34 S. | T. 33 S.
Sister Keys
Bickel Mound Park
Shell Mound
Critical Cr
Critical Bayou
Flounder Pass
Beville Point
Rattlesnake Key
Bird Key
Sea Breeze Point
Palm View Road
Palmetto Point
Skyway Memorial Gardens
Canal Road
Peterson Bayou
TERRA CEIA BAY
Gus Point
Clambar Bayou
Champlain Bayou
Mendoza Road
Ellenton Airport
Seaboard
Coast Line
Memphis
Memphis Heights
Memphis Road
Snead Island
Snead I. Cutoff
McKay Point
Hooker Point
McNeil Point
Manson Memorial Park
Ellenton
PALMETTO
MANATEE RIVER
Point

Sheet #5

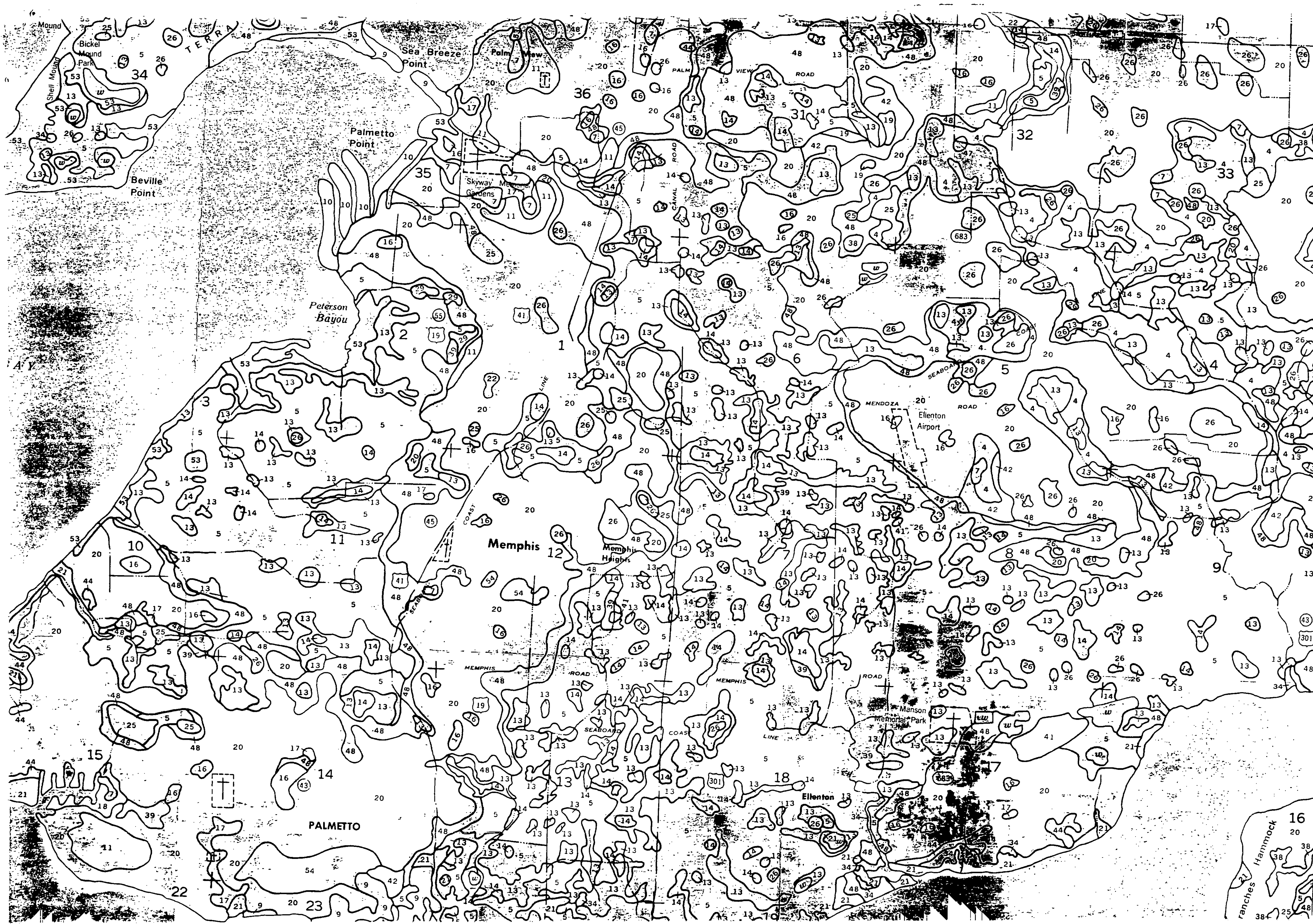


Little Redfish Cr.
Harbor Key
Hells Half Acre
Mariposa Key
Moses Hole
Kitchen Key
Bishop Harbor
Northeast Head
Southeast Head
Gillette
Curiosity Creek
Cabbage Slough
Two Brothers Islands
Horseshoe Key
Clambar Bay
Terra Ceia
Williams Bayou
Frog Creek
Joe Bay
Skyway
Custer Bayou
Tillette Bayou
Boots Point
Shell Mound
Bickel Mound Park
Terra Ceia
Sea Breeze Point
Palm View
Palm View Road
Rubonia
Seaboard Coast Line
McMullen Creek
Buffalo Canal
(Joins sheet 6)

Sheet #5



HILLSBOROUGH COUNTY
TAMPA BAY
Little Redfish Cr
Harbor Key
Hells Half Acre
Northeast Head
Bishop Harbor
Mariposa Key
Kitchen Key
Moses Hole
Southeast Head
Gillette
Horseshoe Key
Clambar Bay
Terra Ceia
Two Brothers Islands
Joe Island
Joe Bay
Williams Bayou
Frog Creek
Frog River
SUNSHINE SKYWAY
Paradise Island
Big Miguel
Little Miguel Pass
Skeet Key
Eds Key
Fletcher Point
Miguel Bay
Custer Bayou
Boots Point
Shell Mound
Tillette Bayou
Terra Ceia
Rubonia
McMullen Creek
Bickel Mound Park
Sister Keys
Sea Breeze Point
Palm View
PALM VIEW ROAD
SEABOARD
COAST LINE
(Joins sheet 4)
1 195 000 FEET


Mound
Shell Mound
Bickel Mound Park
Beville Point
Sea Breeze Point
Palm View
Palmetto Point
Skyway Memorial Gardens
Peterson Bayou
PALM VIEW ROAD
CANAL ROAD
MENDOZA ROAD
Ellenton Airport
SEABOARD COAST LINE
Memphis
Memphis Heights
MEMPHIS ROAD
Manson Memorial Park
Ellenton
PALMETTO
Hammock
T. 34 S. T. 33 S.
(Joins sheet 6)
Sheet #5

REFERENCE # 22

STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES
Tom Gardner, *Executive Director*

DIVISION OF RESOURCE MANAGEMENT
Jeremy A. Craft, *Director*

FLORIDA GEOLOGICAL SURVEY
Walter Schmidt, *State Geologist*

BULLETIN NO. 59

THE LITHOSTRATIGRAPHY OF THE HAWTHORN GROUP (MIOCENE) OF FLORIDA

By
Thomas M. Scott

Published for the
FLORIDA GEOLOGICAL SURVEY
TALLAHASSEE
1988

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OF
NATURAL RESOURCES

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LETTER OF TRANSMITTAL

Bureau of Geology
August 1988

Governor Bob Martinez, Chairman
Florida Department of Natural Resources
Tallahassee, Florida 32301

Dear Governor Martinez:

The Florida Geological Survey, Bureau of Geology, Division of Resource Management, Department of Natural Resources, is publishing as its Bulletin No. 59, *The Lithostratigraphy of the Hawthorn Group (Miocene) of Florida.* This is the culmination of a study of the Hawthorn sediments which exist throughout much of Florida. The Hawthorn Group is of great importance to the state since it constitutes the confining unit over the Floridan aquifer system. It is also of economic importance to the state due to its inclusion of major phosphorite deposits. This publication will be an important reference for future geological investigations in Florida.

Respectfully yours,

Walter Schmidt, Chief
Florida Geological Survey

Printed for the
Florida Geological Survey

Tallahassee
1988

ISSN 0271-7832

SOUTH FLORIDA

Although the Hawthorn Group in south Florida consists of the same general sediment types (carbonate, quartz sand, clay and phosphate), the variability and complexity of the section is different from the strata in northern Florida. In the south Florida area (Figure 1), particularly the western half of the area, the Hawthorn Group consists of a lower, predominantly carbonate unit and an upper, predominantly siliciclastic unit. Eastward the section becomes more complex due to a greater percentage of siliciclastic beds present in the lower portion of the Hawthorn Group.

The differences that exist between the northern and southern sections of the Hawthorn Group require separate formational nomenclature. In southern Florida, the Hawthorn Group consists of in ascending order, the Arcadia Formation (new name) with the Tampa and Nocatee (new name) Members and the Peace River Formation (new name) with the Bone Valley Member (Figure 33). The new nomenclature helps alleviate many of the previously existing problems associated with the relationship of the Bone Valley, Tamiami, Hawthorn, and Tampa units in the south Florida region.

ARCADIA FORMATION

Definition and Type Section

The Arcadia Formation is a new formational name proposed here for the lower Hawthorn carbonate section in south Florida. This unit includes sediments formerly assigned to the Tampa Formation or Limestone (King and Wright, 1979) and the "Tampa sand and clay" unit of Wilson (1977).

Dall and Harris (1892) used the term "Arcadia marl" to describe beds along the Peace River. This term was never widely used and did not appear in the literature again except in reference to Dall and Harris. It appears that their use of the "Arcadia marl" described a carbonate bed now belonging in the Peace River Formation of the upper Hawthorn Group. Riggs (1967) used the term "Arcadia formation" for the carbonate beds often exposed at the bottom of the phosphate pits in the Central Florida Phosphate District. Riggs' use of this name was never formalized. The "Lexicon of Geologic Names" (U.S.G.S., 1966) listed the name Arcadia as being used as a member of the Cambrian Trempealeau Formation in Wisconsin and Minnesota, thereby precluding its use elsewhere. Investigations into the current status of this name indicated that the Arcadia member has not been used in some 25 years and does not fit the current Cambrian stratigraphic framework. The Lexicon also indicates Arcadia clays as an Eocene (Claibornian) unit in Louisiana. This name also has been dropped from the stratigraphic nomenclature of Louisiana (Louisiana Geological Survey, 1984, personal communication). Since these former usages of this name are no longer viable, the term can be used for the lower Hawthorn Group sediments in southern Florida in accordance with Article 20 of the North American Code of Stratigraphic Nomenclature (NACSN, 1983).

The Arcadia Formation is named after the town of Arcadia in DeSoto County, Florida. The type section is located in core W-12050, Hogan #1, DeSoto County (SE¼, NW¼, Section 16, Township 38S, Range 26E, surface elevation 62 feet (19 meters)) drilled in 1973 by the Florida Geological Survey. The type Arcadia Formation occurs between -97 feet MSL (-30 meters MSL) to -520 feet MSL (-159 meters) (Figure 34).

Two members can be recognized within the Arcadia Formation in portions of south Florida. These are the Tampa Member and the Nocatee Member (Figure 33). The members are not recognized throughout the entire area. When the Tampa and Nocatee are not recognized, the section is simply referred to as the Arcadia Formation.

Lithology

The Arcadia Formation, with the exception of the Nocatee Member, consists predominantly of limestone and dolostone containing varying amounts of quartz sand, clay and phosphate grains. Thin beds of quartz sand and clay often are present scattered throughout the section. These thin sands and clays are generally very calcareous or dolomitic and phosphatic. Figure 34 graphically illustrates the lithologies of the Arcadia Formation including the Tampa and Nocatee Members. The lithologies of the

Tampa and Nocatee Members will be discussed separately from the undifferentiated Arcadia Formation.

Dolomite is generally the most abundant carbonate component of the Arcadia Formation except in the Tampa Member. Limestone is common and occasionally is the dominant carbonate type. The dolostones are quartz sandy, phosphatic, often slightly clayey to clayey, soft to hard, moderately to highly altered, slightly porous to very porous (moldic porosity) and micro- to fine crystalline. The dolostones range in color from yellowish gray (5 Y 8/1) to light olive gray (5 Y 6/1). The phosphate grain content is highly variable ranging up to 25 percent but is more commonly in the 10 percent range. The limestones of the Arcadia are typically quartz sandy, phosphatic, slightly clayey to clayey, soft to hard, low to highly recrystallized, variably porous and very fine to fine grained. The limestones are typically a wackestone to mudstone with few beds of packstone. They range in color from white (N 9) to yellowish gray (5 Y 8/1). The phosphate grain content is similar to that described for the dolostones. Fossils are generally present only as molds in the carbonate rocks.

Clay beds occur sporadically throughout the Arcadia Formation. They are thin, generally less than 5 feet thick, and of limited areal extent. The clays are quartz sandy, silty, phosphatic, dolomitic and poorly to moderately indurated. Color of the clay ranges from yellowish gray (5 Y 8/1) to light olive gray (5 Y 6/1). Lithoclasts of clay are often found in other lithologies. Smectite, illite, palygorskite, and sepiolite comprise the clay mineral suite (Reynolds, 1962).

Quartz sand beds also occur sporadically and are generally less than 5 feet thick. They are very fine to medium grained (characteristically fine grained), poorly to moderately indurated, clayey, dolomitic and phosphatic. The sands are usually yellowish gray (5 Y 8/1) in color.

Chert is also sporadically presently in the Arcadia Formation in the updip areas (portions of Polk, Hillsborough, Manatee and Hardee Counties). In many instances the chert appears to be silicified clays and dolosilts.

Subjacent and Suprajacent Units

The Arcadia Formation overlies either the Ocala Group or the "Suwannee" Limestone in the south Florida region (Figure 8). The contact between the basal Arcadia and the Ocala Group is an easily recognized unconformity. In the north central and northeastern portions of southern Florida, where the Hawthorn Group overlies the Ocala Group (Figures 8 and 41), the Arcadia is characteristically a gray, hard, quartz sandy, phosphatic dolostone with a few siliciclastic interbeds. This is in contrast to the Ocala Group, which is a cream to white, fossiliferous, soft to hard limestone (packstone to wackestone).

Throughout most of south Florida, the Hawthorn Group overlies limestones most often referred to as the "Suwannee" Limestone (Figure 33). In much of this area the contact is recognizably unconformable. The contrast between the sandy, phosphatic, fine-grained to finely crystalline carbonates of the Arcadia and the coarser grained nonphosphatic, non-quartz-sandy limestones of the "Suwannee" Limestone allow the contact to be easily placed. However, in the downdip areas (e.g., Lee and Charlotte Counties and further south) the contact becomes more obscure. In this area the contact is placed at the base of the last occurrence of a sandy, variably phosphatic carbonate.

The limestones underlying the Arcadia are referred to as "Suwannee" limestone due to the uncertainty of the formational assignment. These sediments have characteristically been called "Suwannee" by previous workers despite the fact that they have never been accurately correlated with the typical Suwannee Limestone in northern Florida. Hunter (personal communication, 1984) believes that these carbonates are not Suwannee or the equivalent but are an unnamed limestone of Chickasawhayan Age (Late Oligocene).

Unconformably overlying the Arcadia Formation is the Peace River Formation (Figure 33). The Peace River Formation is predominantly a siliciclastic unit with varying amounts of carbonate beds. The percentage of carbonate beds is higher near the base of the Peace River, resulting in a transitional or gradational contact with the Arcadia. In some areas the contact is often marked by a phosphatic rubble zone and/or a phosphatized dolostone hardground. In the more gradational sequence the contact is placed where the carbonate beds become significantly more abundant than the siliciclastic beds.

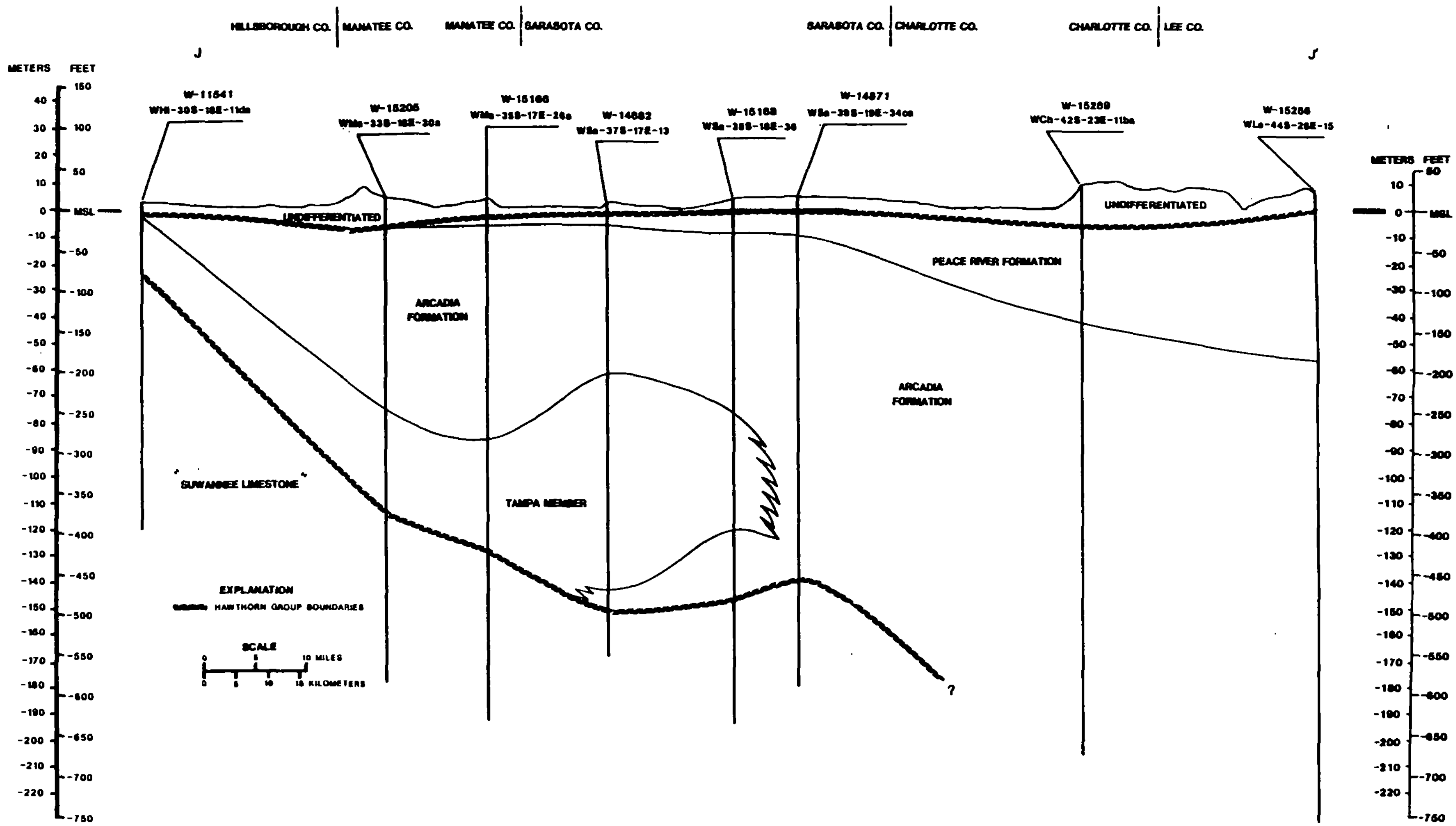

Figure 38. Cross section J-J' (see figure 3 for location).

Lithology

The Tampa Member consists predominantly of limestone with subordinate dolostone, sands, and clays. The lithology of the Tampa is very similiar to the limestone portion of the Arcadia Formation with the exception of its phosphate content which is almost always noticeably less than in the Arcadia. Phosphate grains generally are present in the Tampa in amounts less than 3 percent although beds containing greater percentages do occur, particularly near the facies change limits of the member.

Lithologically, the limestones are variably quartz sandy and clayey with minor to no phosphate. Fossil molds are often present and include mollusks, foraminifera and algae. Colors range from white (N 9) to yellowish gray (5 Y 8/1). The limestones range from mudstones to packstones but are most often wackestones. The dolostones are variably quartz sandy and clayey with minor to no phosphate. They are typically microcrystalline to very fine grained and range in color from pinkish gray (5 YR 8/1) to light olive gray (5 Y 6/1). The dolostones often contain fossil molds similar to those in the limestones.

Sand and clay beds occur sporadically within the Tampa Member. Lithologically, they are identical to those described for the Arcadia Formation except for the phosphate content which is significantly lower in the Tampa Member.

Siliceous beds are often present in the more updip portions of the Tampa. In the type area near Tampa Bay the unit is well known for silicified corals, siliceous pseudomorphs of many different fossils and chert boulders.

Subjacent and Suprajacent Units

The Tampa Member overlies the "Suwannee" Limestone in areas where the Nocatee Member is not present and the Tampa Member forms the base of the Arcadia. The boundary often appears gradational as discussed by King (1979) and King and Wright (1979). Figure 19 indicates an unconformable time relationship with the "Suwannee" Limestone which often is not apparent lithologically. This indicates a probable reworking of underlying materials into the Tampa Member obscuring the unconformity.

The Tampa Member overlies the Nocatee Member in the area where both are present (Figure 33). The contact appears conformable and is easily recognized. In a few areas where the Nocatee is absent, the Tampa may overlie undifferentiated Arcadia Formation sediments. The Tampa Member may be both overlain and underlain by undifferentiated Arcadia.

The Tampa Member is overlain throughout most of its extent by carbonates of the undifferentiated Arcadia Formation. The contact often appears gradational over one or two feet. An increase in phosphate grain content is the dominant factor in defining the lithologic break. In updip areas the Tampa may be overlain by siliciclastic sediments of the Peace River Formation. Further updip it may be exposed at the surface or covered by a thin veneer of unconsolidated sands and clays which may represent residuum of the Hawthorn sediments. Figure 35 through 39 show the relationship of the Tampa Member to the overlying and underlying units.

Thickness and Areal Extent

The Tampa Member is quite variable in thickness throughout its extent. It thins updip to its northern limit where it is absent due to erosion and possibly nondeposition. The thickest section of Tampa encountered is in W-14882 in Sarasota County where 270 feet (82 meters) of section are assigned to this member (Figure 45). More typically an average thickness is approximately 100 feet (30.5 meters).

The top of the Tampa Member (Figure 46) ranges in elevation from as high as +75 feet (23 meters) MSL in northeastern Hillsborough County to -323 feet (-98.5 meters) MSL in northern Sarasota County. The lowest elevation for the top of the unit occurs in a rather large depression that encompasses part of northern Sarasota County and southern Manatee County.

The Tampa dips towards the south in the northern half of the area of occurrence (Figure 46). Dip direction in the southern half is more to the southwest and west. Dip angle varies from place to place but the

REFERENCE # 23

HYDROGEOLOGIC [redacted] THE FLORIDAN AQUIFER SYSTEM IN FLORIDA AND IN PARTS OF GEORGIA, ALABAMA, AND SOUTH CAROLINA

REGIONAL AQUIFER-SYSTEM ANALYSIS

Hydrogeologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina

By JAMES A. MILLER

REGIONAL AQUIFER-SYSTEM ANALYSIS

U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1403-B

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON: 1986

grade updip by facies change into calcareous, glauconitic, clastic rocks. This carbonate-clastic transition lies farther to the north and west in lower Eocene strata than it does in the underlying Paleocene and is located still farther north and west in middle Eocene rocks. Upper Eocene rocks retain their carbonate character in many places up to the point where they are truncated by erosion. The overall effect is that of a general regional transgression that began in Paleocene time and persisted through the late Eocene and during which the marine facies of progressively younger rocks extended progressively farther and farther inland. Several minor regressions punctuated this general transgression. These observations are consistent with the sea level curve of Vail and others (1977), which shows that sea level worldwide became progressively higher from early to late Eocene time.

Rocks of early Eocene age

Downdip, a lower Eocene carbonate sequence underlies southeastern Georgia and the Florida peninsula; updip, the remainder of the study area is underlain by clastic lower Eocene rocks. Locally, in South Carolina, the Eocene in the subsurface is an impure limestone. Plate 4 shows the configuration of the top of rocks of early Eocene age and the area where they crop out. Comparison of plate 4 with a map of the structural surface of the Paleocene (pl. 3) shows that, in Alabama and southwestern Georgia, lower Eocene rocks lie to the south and east of Paleocene rocks in offlap relationship. In central Georgia, however, beds of early Eocene age overlap and extend farther to the north than the underlying Paleocene rocks. Lower Eocene rocks are known to extend farther to the north in this overlap area than plate 4 shows, but they have been mapped during this study only to the limits of the well control used to delineate the Floridan aquifer system. In the western part of the study area, the configuration of the top of the early Eocene is contoured up to the limit of outcrop of these rocks (pl. 4).

Many of the large- to intermediate-scale structural features that affect the shape of the Paleocene surface (pl. 3) are recognizable on the early Eocene surface (pl. 4). Those features common to both maps include (1) the Peninsular arch in north-central Florida, (2) the Southeast Georgia embayment, and (3) a steep, steady slope toward the Gulf Coast geosyncline in the western part of the study area. The Southwest Georgia embayment in eastern panhandle Florida is a negative area on both the Paleocene and early Eocene tops, but this feature is deeper and narrower and extends farther to the northeast on the early Eocene surface than it does on the top of the Paleocene. The configuration of the South Florida basin in southwestern peninsular Florida likewise differs on the Paleocene and early Eocene surfaces. This feature was somewhat silled on its gulfward side in Paleocene time (pl. 3) but, at the end of early Eocene time (pl. 4) it was open to the gulf and appears to have been partially filled from the east and northeast. The Suwannee strait, a closed low that appears in southeastern Georgia on the map of the Paleocene surface, was apparently filled with sediments during early Eocene time and thus does not exist on the map of the early Eocene surface.

The maximum measured depth to the top of lower Eocene rocks is about 3,900 ft below sea level in well ALA-BAL-30 in the southern part of Baldwin County, Ala. The maximum contoured depth is below 4,200 ft, in the same general area. Lower Eocene rocks are slightly less than 800 ft below sea level on the crest of the Peninsular arch, from which they deepen in all directions. In the Southwest Georgia embayment and the South Florida basin, the top of lower Eocene rocks is below 2,600 ft.

The thickness of lower Eocene strata is shown on plate 5, along with the distribution of the clastic and carbonate facies within this unit. The clastic-carbonate boundary and much of the contouring shown on this plate are derived from well control. In areas of sparse control, the thickness of the early Eocene has been estimated as the difference between contoured altitudes of the top of the early Eocene (plate 4) and the top of the Paleocene (plate 3). In south Florida, lower Eocene rocks are more than 1,500 ft thick; in parts of panhandle Florida, they are more than 1,100 ft thick. On the crest of the Peninsular arch, these strata are less than 300 ft thick, and they thin to a featheredge in areas of outcrop.

Oldsmar Formation—Except for the Fishburne Formation that occurs locally in South Carolina, all the lower Eocene carbonate rocks in the study area are part of the unit that Applin and Applin (1944) named the Oldsmar Limestone. The Oldsmar, however, contains much dolomite, and thin beds of chert and evaporite deposits occur in the unit from place to place. The Oldsmar is therefore referred to as a "formation" rather than a "limestone."

The Oldsmar Formation consists mostly of off-white to light-gray micritic to finely pelletal limestone thickly to thinly interbedded with gray to tan to light-brown, fine to medium crystalline, commonly vuggy dolomite. The lower part of the formation is usually more extensively dolomitized than the upper part. Pore-filling gypsum and thin beds of anhydrite occur in the lowermost parts of the Oldsmar in places, particularly in a crescent-shaped band extending from Dixie County, Fla., northeast to southern Ware County, Ga

The location of this band, which locally comprises the base of the Floridan aquifer system, is shown on plate 33. In scattered places, the Oldsmar contains trace amounts of glauconite.

Applin and Applin (1944, p. 1699) defined the Oldsmar "to include the interval that is marked at the top by the presence of abundant specimens of *Helicostegina gyralis* Barker and Grimsdale...and that rests on the Cedar Keys limestone." This definition is unsatisfactory because (1) it is based on the microfaunal content of the strata, not on their lithologic characteristics, and (2) it is based on a species whose range is not restricted to the early Eocene. The author has found specimens of *H. gyralis* that show no evidence of reworking 50 to 70 ft above the top of the Oldsmar in rocks that are part of the overlying middle Eocene sequence ("Lake City" Limestone). Cole and Gravell (1952) reported this species from middle Eocene beds in Cuba. The Oldsmar Formation is thus redefined herein as the sequence of white to gray limestone and interbedded tan to light-brown dolomite that lies between the pelletal, predominantly brown limestone and brown dolomite of the middle Eocene and the gray, coarsely crystalline dolomite of the Cedar Keys Formation. *H. gyralis* is commonly found as part of a characteristic Oldsmar fauna that includes several other species of larger foraminifers listed in table 1. None of these species, however, is ubiquitous within the Oldsmar Formation, nor should they be the criterion by which the Oldsmar is defined.

The Oldsmar Formation underlies all of the Florida peninsula and the southeastern corner of Georgia (pl. 5). Westward, in the eastern part of the Florida panhandle, the Oldsmar becomes increasingly argillaceous and interfingers with calcareous clastic rocks. To the north, in south-central Georgia, the Oldsmar grades from limestone through argillaceous limestone and calcareous clay into glauconitic calcareous sand.

In addition to *H. gyralis*, the larger Foraminifera *Miscellanea nassauensis* Applin and Jordan, *Pseudophragmina (Proporocyclina) cedarkeysensis* Cole, and *Lockhartia sp.* are considered characteristic of the Oldsmar Formation.

UNDIFFERENTIATED LOWER EOCENE ROCKS—Lower Eocene rocks in the western part of the Florida panhandle consist of brownish- to greenish-gray, calcareous, slightly glauconitic shale and siltstone that are occasionally micaceous. Thin beds of fine-grained, slightly glauconitic sandstone and off-white sandy glauconitic limestone occur sporadically throughout the predominantly argillaceous section. These rocks are part of the unit that was called the "clastic facies of Wilcox age" by Applin and Applin (1944) and the "Wilcox Formation" by Chen (1965). Both Chen and the Applins included beds that are the downdip equivalents of the Nanafalia Formation, the Tuscahoma Formation, and the Salt Mountain Limestone in their "Wilcox" unit. In this report, the Nanafalia, Tuscahoma, and Salt Mountain are considered to be of Paleocene age and to grade downdip into undifferentiated argillaceous rocks of Paleocene age. The term "undifferentiated early Eocene rocks" is herein applied to the massive, predominantly argillaceous early Eocene section of western panhandle Florida. These strata grade eastward into the Oldsmar Formation and become less marine and slightly coarser grained updip in southern Alabama and southwestern Georgia, where they take on the character of the outcropping Hatchetigbee Formation.

Microfauna considered characteristic of undifferentiated rocks of early Eocene age include the Foraminifera *Globorotalia formosa gracilis* Bolli and *Rotalia trochoidiformis* (Lamarck). The Foraminifera *Globorotalia subbotinae* Morozova and *G. wilcoxensis* (Cushman and Ponton) are also considered characteristic of early Eocene rocks in the study area, even though these species are known to range downward into rocks of late Paleocene age elsewhere (Stainforth and others, 1975). The Ostracoda *Brackhcythere jessupensis* Howe and Garrett and *Haplocytheridea sabinensis* (Howe and Garrett) are also considered characteristic of these beds.

BASHI AND HATCHETIGBEE FORMATIONS—The lithology of the Hatchetigbee Formation in the area where it crops out in western Alabama is very similar to that of the underlying Tuscahoma. In practice, the two are difficult to separate except where the sandy, glauconitic, highly fossiliferous Bashi Formation (Gibson, 1982b) lies between them. The Bashi occurs only as erosional remnants in eastern Alabama and western Georgia. Downdip, the Hatchetigbee consists of interbedded fine sand and gray calcareous clay. The sand is lost in a short distance gulfward, and the argillaceous Hatchetigbee beds merge in middip areas with the underlying clay of the Tuscahoma.

UNNAMED MID-GEORGIA LOWER EOCENE ROCKS—In the west-central part of the Georgia coastal plain, lower Eocene rocks consist of medium-grained, calcareous, often dolomitic, glauconitic sandstone interbedded with soft, light-gray, calcareous, glauconitic clay. The sandstone ranges from unconsolidated to well indurated, depending on the amount of calcareous matrix that binds the sand grains. Although these strata are the probable equivalents of the combined Hatchetigbee Formation of eastern Alabama and southwestern Georgia, they are unnamed at present and are not shown on the correlation chart (pl. 2) because their relation to the Hatchibtigbee is still inexactly known.

Georgia and peninsular Florida appear to die out downward within the middle Eocene. An exception is the fault in Palm Beach County, Fla., which cuts rocks at least as old as Paleocene (pl. 3). The series of northeast-trending faults in south-central Georgia bounds several small grabens and half grabens that are collectively called the Gulf Trough (Herrick and Vorhis, 1963). Like most of the faults in peninsular Florida, the Gulf Trough faults appear to die out at shallow depths. A seismic profile was obtained across one of the major Gulf Trough faults in northeastern Colquitt County, Ga., as part of this study. The record on this profile is poor down to a depth of approximately 1,200 ft below land surface. Deeper than about 1,300 ft (roughly the middle of rocks of middle Eocene age), however, sharp reflectors can easily be traced on the profile and do not show the graben structure that well data prove to exist at shallower depths.

The maximum measured depth to the top of the middle Eocene is 3,490 ft below sea level in well ALA-BAL-30 in southwestern Baldwin County, Ala. The maximum contoured depth is below 3,700 ft in the same area (pl. 6). The top of the middle Eocene slopes in all directions from the crest of the Peninsular arch and reaches depths of more than 1,800 ft in the Southwest Georgia embayment, more than 1,600 ft in the South Florida basin, and more than 1,000 ft in the Southeast Georgia embayment. Middle Eocene rocks are slightly above sea level at scattered places on the Peninsular arch. They are exposed at the surface in Citrus and Levy Counties, Fla., where they represent the oldest outcropping rocks in the state.

The thickness of middle Eocene rocks is shown on plate 7, which also shows the limits of the unit's clastic and carbonate facies. The position of the interface between these facies is approximate because it is based on well control. The thickness trends shown on plate 7 have been extended in areas where well control is scattered by subtracting the contoured tops of rocks of early and middle Eocene age. From a featheredge in outcrop areas, the middle Eocene thickens seaward to more than 1,200 ft in the Southwest Georgia embayment and to more than 1,000 ft in southeastern Georgia. Along panhandle Florida's Gulf Coast, these strata are more than 900 ft thick. They thin to less than 500 ft over the crest of the Peninsular arch and thicken southward to more than 1,600 ft in east-central peninsular Florida. Although the middle Eocene is between 1,000 and 1,400 ft thick in most of southern Florida, the unit thins to less than 900 ft in part of the South Florida basin, and shows that this basin was not subsiding rapidly during middle Eocene time.

✱ Avon Park Formation—Applin and Applin (1944, p. 1686) applied the name Avon Park Limestone to the upper part of the late middle Eocene section in a well at the Avon Park Bombing Range in the southernmost part of Polk County, Fla. They referred to the Avon Park as "a distinct faunal unit" and described it as "mainly cream-colored, highly microfossiliferous, chalky limestone" that locally contains some gypsum and chert and that is commonly partially dolomitized. Well cuttings examined during this study show that the Avon Park is in many places composed almost entirely of dolomite. The Avon Park is thus referred to in this report as a "formation" rather than a "limestone."

The term Lake City Limestone was introduced by Applin and Applin (1944, p. 1693) for the lower part of rocks of middle Eocene age in a well at Lake City in Columbia County, Fla. The Lake City was described as "alternating layers of dark brown and chalky limestone"; gypsum and chert are present in some wells. Regionally, the lower part of the middle Eocene, like the upper part, contains much dolomite.

In the early 1940's, there were few deep wells in Florida, and the samples from many of these wells were either contaminated or incomplete. Electric logging was a new technique at the time, and those few logs that were in existence were largely unreliable. A common practice in subsurface stratigraphy was to use paleontologic and lithologic units interchangeably. All of these factors led to imprecise definitions for most of the limestone units of Florida. Between some adjacent "formations," lithologic change is subtle; in places, there is no change at all. Stratigraphic breaks in much of the Florida section currently are based upon a change in the benthic microfauna that the rocks contain. Where dolomitization has obliterated the microfauna, or where it is lacking in nondolomitized sections, correlations are inconsistent. Although most workers studying the Florida subsurface recognize the problem, almost all Tertiary limestone correlations are still made on the basis of the microfaunal assemblages that Applin and Applin (1944) and Applin and Jordan (1945) thought were diagnostic. This practice is, of course, not in accordance with the rules of the current North American Stratigraphic Code (North American Commission on Stratigraphic Nomenclature, 1983). Units that are in reality biostratigraphic units have been mapped as if they were rock-stratigraphic units. Fortunately, as Winston (1976), recognized, the paleontologically defined units of Applin and Applin (1944) in many cases coincide with lithologic units. Exceptions to this generalization are the Avon Park and Lake City Limestones.

There are no lithologic criteria that can be used to separate the middle Eocene carbonate rocks in Florida and in southern Georgia. Both the so-called Avon Park and Lake City Limestones consist primarily of cream, tan, or light-brown, soft to well-indurated limestone that is mostly pelletal but is locally micritic. The pellets consist of fine to coarse sand-sized particles of micritic to fine crystalline limestone and small- to medium-sized Foraminifera; they are bound by a micritic to finely crystalline limestone matrix. The limestone is thinly to thickly interbedded with cream or light- to dark-brown, fine to medium crystalline, slightly vuggy dolomite, fractured in some places, whose texture is locally sucrosic to argillaceous. Locally, differences exist between the general lithologic character of the lower part of the middle Eocene and that of its upper part. Unfortunately, two of the limited number of wells available to the Applins (the Avon Park Bombing Range and Lake City wells) showed such contrasts, and it was on the basis of the limited data then available that the Avon Park and Lake City were named and extended regionally. More recent drilling shows conclusively that the rock types that the Applins thought were representative of their "Lake City" are found in many places at the top of the middle Eocene (in their "Avon Park" part) and the reverse is also true.

Paleontologic criteria by which the Avon Park and Lake City can be differentiated are lacking. In the original definition of both the Avon Park and the Lake City, certain faunal zones by which these units could be recognized were listed. The Lake City was thought to extend from the highest occurrence of *Dictyoconus americanus* (Cushman), accompanied by *Fabularia vaughani* Cole and Porter, down to the highest occurrence of *Helicostegina gyralis* Barker and Grimsdale, thought to characterize the Oldsmar. None of these species is restricted to the horizon for which it is supposed to be characteristic. *H. gyralis* commonly occurs several hundred feet above a typical Oldsmar lithology. In this study, *Fabularia vaughani* has been found at or just below the top of the middle Eocene—in the "Avon Park" part. *Dictyoconus americanus* has been reported by Cole (1944, 1945) and by Vernon (1951) from the upper part of the middle Eocene. The author has found several additional species that were listed as diagnostic Lake City Foraminifera by Applin and Jordan (1945) within 20 to 50 feet of the top of the uppermost middle Eocene. These species include *Discorbis inornatus* Cole, *Fabularia gunteri* Applin and Jordan, and *Gunteria floridana* Cushman and Ponton. Cole and Gravell (1952) found several supposedly diagnostic Lake City species in the same beds as supposedly diagnostic Avon Park species in the outcropping middle Eocene of Cuba. The Avon Park was originally defined by Applin and Applin (1944) as extending from the highest occurrence of *Coskinolina floridana* Cole downward to the top of *Dictyoconus americanus*. As Applin and Applin (1944, p. 1687), recognized, however, that *Coskinolina floridana* is abundant in the Oligocene Suwannee Limestone in many places.

The so-called Avon Park and Lake City Limestones cannot be distinguished from each other on the basis of either lithology or fauna, except locally. Therefore, it is here proposed that the term "Lake City" be abandoned and that all of the cream to brown pelletal limestone and interbedded brown to cream dolomite of middle Eocene age in peninsular Florida and southern Georgia be placed in the Avon Park Formation. The term "Avon Park" is retained because (1) it has precedence over the term "Lake City," (although both the Avon Park and the Lake City were named in the same report by Applin and Applin (1944), the Avon Park was described on an earlier page in that paper) and (2) the term has traditionally been applied to rocks whose lithology is different from that of the overlying Ocala Limestone. The Avon Park is more properly called a "formation" rather than a "limestone" because it contains appreciable amounts of rock types other than limestone. The extended definition of the Avon Park Formation proposed here refers to the sequence of predominately brown limestones and dolomites of various textures that lies between the gray, largely micritic limestones and gray dolomites of the Oldsmar Formation and the white foraminiferal coquina or fossiliferous micrite of the Ocala Limestone.

The reference section proposed for the extended Avon Park Formation is the interval from 221 to 1,190 ft below land surface in the Coastal Petroleum Company's No. 1 Ragland well in sec. 16, T. 15 S, R. 13 E, in Levy County, Fla. Cuttings from this well are on file at the Florida Bureau of Geology, Tallahassee, Fla., as well W-1537 or permit number 66. The well is numbered FLA-LV-4 in this report. A lithologic description of the cuttings from the proposed type well is given in the Appendix of this report. The top of the Avon Park is not known in the type well because there is a gap in the cuttings from the basal Ocala at a depth of 110 ft to the uppermost Avon Park sample at 221 ft. Figure 5 shows a representative electric log pattern for the Avon Park Formation (extended) in a nearby well in Levy County, Humble's No. 1 C. E. Robinson (well FLA-LV-5 of this report).

Fauna considered characteristic of the revised Avon Park Formation include the Foraminifera *Spirolina coreyensis* (Cole), *Lituonella floridana* (Cole), *Discorbis inornatus* Cole, *Valvulina cushmani* Applin and Jordan, *V. martii* Cushman and Bermudez, *Fabularia vaughani* Cole and Ponton, *Textularia coreyensis* Cole, *Gunteria floridana* Cushman and Ponton, *Pseudorbitolina cubensis* Cushman and Bermudez, *Amphistegina lopeztrigoni* Palmer, and *Lepidocyclina antillea* Cushman (formerly called *L. gardnerae* Cole). Fragments of the alga *Clypeina infundibuliformia* Morellet and Morellet are also considered characteristic of the Avon Park.

To the north and west, the Avon Park Formation grades into an argillaceous, soft to semi-indurated, micritic, glauconitic limestone that in turn grades updip into calcareous, glauconitic, often shelly sand and clay beds that are parts of the Lisbon and Tallahatta Formations. The middle third of the revised Avon Park Formation in the eastern half of the Florida peninsula and in much of southeastern Georgia is micritic, low-permeability, finely pelletal limestone. Approximately the lower half of the extended Avon Park in west-central peninsular Florida consists of low-permeability dark-colored gypsiferous limestone and dolomite. Both the micritic limestone and the gypsiferous carbonate beds comprise important subregional confining units within the Floridan aquifer system.

TALLAHATTA FORMATION—Where the Tallahatta Formation crops out in western Alabama, it consists largely of greenish-gray, porous, fine-grained siliceous claystone (called buhrstone in older reports) and some interbedded sands that are calcareous and fossiliferous near the top of the unit. In eastern Alabama, the outcropping Tallahatta is mostly poorly sorted, occasionally gravelly sand interbedded with greenish-gray clay and calcareous sand near the top. In southwestern Georgia, the outcropping Tallahatta is somewhat more marine than it is in Alabama and consists of fine- to coarse-grained slightly fossiliferous sand interbedded with dark-brown, silty, micaceous, occasionally glauconitic limestone. Chert is common near the base of the Tallahatta in updip areas in Georgia.

Downdip, in both Alabama and Georgia, the Tallahatta consists largely of interbedded gray to greenish-gray glauconitic sand and greenish-gray to brownish-gray shale; light- to dark-brown glauconitic fossiliferous limestone is common. Farther seaward in Georgia, the Tallahatta grades into cream to light-gray glauconitic, argillaceous, somewhat sandy limestone that in turn grades into the revised Avon Park Formation. Along and just to the north of the Gulf Coast of Alabama and western panhandle Florida, the Tallahatta consists mostly of gray to greenish-gray clay and thin to moderately thick interbeds of fine-grained, glauconitic, calcareous sand. Neither the limestone facies nor the calcareous clay and sand of western Florida and southern Alabama can be distinguished from similar overlying strata that are considered to be the Lisbon Formation in this study. In northeastern Georgia, the Tallahatta is mostly gray, calcareous, fossiliferous clay and has a thin sequence of calcareous sand and glauconitic limestone at the base. These strata grade northeastward into calcareous shelly sand

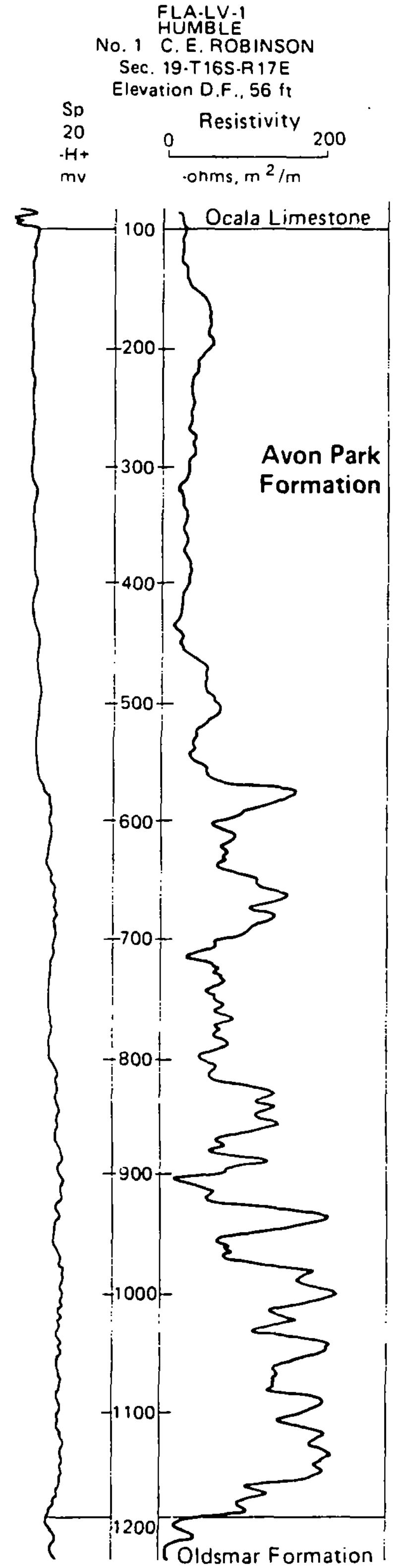

Figure 5. Representative electric log pattern for the Avon Park Formation.

part of peninsular Florida, they are less than 100 ft thick in an area that trends east-west across the peninsula. There is much local variation in the thickness of the upper Eocene because of the effects of erosion and (or) dissolution of these rocks, especially in and near the places where they crop out.

OCALA LIMESTONE—Dall and Harris (1892) applied the name Ocala Limestone to the limestone exposed in quarries near Ocala in Marion County, Fla. These rocks were incorrectly correlated with strata in Alabama that were thought then to be Eocene but that are now known to be of Oligocene age. Cooke (1915) was the first to assign the Ocala to its correct upper Eocene stratigraphic position. Applin and Applin (1944) divided the Ocala into upper and lower members. This twofold division of the formation is still used by the U.S. Geological Survey at the time of this writing (1984). However, the Florida Bureau of Geology considers the Ocala to be a group consisting of, in ascending order, the Inglis, Williston, and Crystal River Formations, as Puri (1953b) proposed.

Puri's three formations cannot be recognized lithologically even at their type sections and cannot be differentiated in the subsurface. This author does not consider the Inglis, Williston, and Crystal River Formations to be either readily recognizable nor mappable, and the terms are not used in this report. As Applin and Applin (1944) recognized, the Ocala consists in many places of two different rock types. The upper part of the Ocala is a white, generally soft, somewhat friable, porous coquina composed of large Foraminifera, bryozoan fragments, and whole to broken echinoid remains, all loosely bound by a matrix of micritic limestone. This coquina is the typical Ocala of the literature and comprises much of the formation. The lower part of the Ocala consists of cream to white, generally fine grained, soft to semi-indurated, micritic limestone containing abundant miliolid remains and scattered large foraminifers. Locally, in southern Georgia, the lower part of the Ocala is slightly glauconitic. This lower fine-grained facies of the Ocala is not everywhere present and may locally be dolomitized wholly or in part. In southern Florida, the entire Ocala is composed of micritic to finely pelletal limestone in places. Because the twofold division of the Ocala is not everywhere recognizable and because the lower micritic unit is thin where it occurs, the two members are not differentiated in this report.

The Ocala Limestone is found throughout Florida (except where it has been locally removed by erosion) and underlies much of southeastern Alabama and the Georgia coastal plain. The Ocala is one of the most permeable rock units in the Floridan aquifer system. The surface of the formation is locally very irregular as a result of the dissolution of the limestone and the development of karst topography. Locally, the upper few feet of the Ocala in the subsurface consist of white, soft, clayey residuum. Where the formation is exposed at the surface, such residuum may also be present (as in southwestern Georgia), but the clayey material is ocher to red there owing to the oxidation of the small amounts of iron that it contains.

Fauna considered characteristic of the Ocala Limestone include the Foraminifera *Amphistegina pinarensis cosdeni* Applin and Jordan, *Lepidocyclina ocalana* Cushman, *L. ocalana floridana* Cushman, *Eponides jacksonensis* (Cushman and Applin), *Gyroidina crystalriverensis* Puri, and *Operculina mariannensis* Vaughn. Although the foraminiferal genus *Asterocyclina* is not restricted to the late Eocene, it usually is not found above the top of the Ocala in the study area. The Ostracoda *Cytheretta alexanderi* Howe and Chambers and *Jugosocythereis bicarinata* (Swain) are found in shallower water parts of the Ocala as well as in its clastic equivalents.

MOODYS BRANCH FORMATION—In western panhandle Florida, the Ocala thins and, although the upper part of the formation retains its typical coquinoid character, the lower part grades westward into soft gray clay and minor interbedded fine-grained sand. This lithology is correlative with the outcropping Moodys Branch Formation of western Alabama, which consists of greenish-gray, calcareous, glauconitic sand and clay and a few layers of sandy limestone.

YAZOO CLAY—The upper part of the Ocala in central Alabama grades northward and westward through a white, massive, fine-grained, clayey, glauconitic limestone into the outcropping Yazoo Clay in western Alabama and eastern Mississippi. The Yazoo can be locally divided into four members (Murray, 1947), (from oldest to youngest): (1) the North Twistwood Creek Clay, a bluish-gray, sandy, slightly calcareous, fossiliferous clay; (2) the Cocoa Sand, a yellowish-gray, fine- to medium-grained, massive, fossiliferous sand; (3) the Pachuta Marl, a light greenish-gray, clayey, fossiliferous, calcareous sand or sandy limestone; and (4) the Shubuta, a light-gray to white, calcareous, fossiliferous, sandy clay. These divisions of the Yazoo can be traced in the subsurface for only a short distance downdip from their area of outcrop.

Fauna considered to characterize the Yazoo Clay, its middip equivalents, and the basal clastic part of the Ocala in the Florida panhandle include the Foraminifera *Bulimina jacksonensis* Cushman, *Robulus gutticostatus cocoaensis* (Cushman), and *Globigerina tripartita* Koch. Ostracoda that characterize these beds include *Cytheretta alexanderi* Howe and Chambers, sists of carbonate rocks throughout all of the study area except for southwestern Alabama, western panhandle Florida, and parts of northeastern Georgia and southwestern South Carolina, where clastic strata make up an important part of the Oligocene. The few scattered outliers of Oligocene lying between the two main bodies shown on plate 10, indicate that these rocks extended over a much wider area before being removed by erosion. Older rocks are exposed at scattered places within the widespread but generally thin body of the Oligocene in Georgia, where erosion has removed all of the Oligocene locally. The locations of most of the Oligocene outliers and the places where Oligocene rocks have been stripped are based on well data compiled for this study. A few of these features, however, are located from published sources, and thus lie in places where no well control is shown on plate 10. Erosional remnants to the north and west of the general updip limit of the Oligocene show that these rocks once extended over a much wider area.

Both large- and small-scale structural features affect the configuration of the Oligocene top. Large-scale features include (pl. 10) (1) the steep gulfward slope of the unit in southwestern Alabama, which reflects subsidence of the Gulf Coast geosyncline, (2) the low area in southern Gulf County, Fla., that represents the Southwest Georgia embayment, (3) the negative area in Glynn County, Ga., and adjacent counties that is the Southeast Georgia embayment, and (4) a low area in southwestern peninsular Florida that may represent a remnant of the South Florida basin. The northwest-southeast orientation of the axis of the South Florida basin is different from its alinement on the surface of older rock units (compare, for example, pls. 8 and 10). The high area shown on the Oligocene surface along the Gulf of Mexico parallel to the South Florida basin is not present on the upper Eocene top. This high probably acted as a sill or barrier during Oligocene time and partly restricted open circulation between the South Florida basin and the ocean. Smaller structural features shown on plate 10 include the northeast-trending series of small grabens in central Georgia that are collectively called the Gulf Trough and a coast-parallel normal fault that extends from Indian River County southeast through Martin County, Fla. The Oligocene has been eroded from the upthrown side of this fault but is preserved on its downthrown side.

The Oligocene top slopes generally seaward from a high of more than 300 ft above sea level in the unit's outcrop area in central Georgia to slightly more than 600 ft below sea level in both the Southwest and Southeast Georgia embayments. This general seaward slope is interrupted in northern Florida by a high area extending from Leon County eastward to Columbia County, where Oligocene rocks crop out. From a second outcrop area that extends southward from Citrus to Hillsborough Counties, Fla., Oligocene rocks slope into the South Florida basin, where the Oligocene top is more than 900 ft below sea level. The maximum measured depth to the top of the Oligocene is about 2,680 ft below sea level in well ALA-BAL-30 in southern Baldwin County, Ala. The maximum contoured depth is below 3,200 ft, to the southwest of this well. Although the top of the Oligocene is affected locally by erosion and karst topography, it is not as irregular as the top of upper Eocene strata.

The thickness of the Oligocene Series is shown on plate 11. Most of the contouring shown on this plate is based on well data. Where wells are scattered, the thickness of Oligocene rocks has been estimated by subtracting contours that represent the tops of upper Eocene and Oligocene rocks (pls. 8 and 10). Oligocene strata are generally less than 200 ft thick in the study area. Exceptions are southwestern Florida, where these rocks are more than 400 ft thick; southern Gulf and Franklin Counties, Fla., where they are more than 600 ft thick; and the southernmost part of Alabama, where they are more than 800 ft thick. These thick areas represent the South Florida basin, the Southwest Georgia embayment, and the northeastern rim of the Gulf Coast geosyncline, respectively. Throughout most of eastern Georgia and all of South Carolina, the thickness of the Oligocene Series only locally exceeds 100 ft and is generally 50 ft or less.

Suwannee Limestone and equivalent rocks

The name "Suwannee Limestone" was proposed by Cooke and Mansfield (1936, p. 71) for "yellowish limestone typically exposed along the Suwannee River in Florida, from Ellaville...almost to White Springs...." They considered these beds to be of Oligocene (Vicksburgian) age rather than Miocene as previous investigators had postulated. Cores and well cuttings examined during this study show that the Suwannee usually consists of two rock types: (1) cream to tan, crystalline, highly vuggy limestone containing prominent gastropod and pelecypod casts and molds and (2) white to cream, finely pelletal limestone containing small foraminifers and pellets of micrite bound by a micritic to finely crystalline limestone matrix. Although these two rock types are complexly interbedded in places, the pelecypod cast-and-mold limestone is more characteristic of the upper part of the Suwannee and is the lithology most representative of the entire formation in most of Georgia and eastern panhandle Florida. The micritic pelletal limestone that is characteristic of the lower part of the Suwannee is locally

found higher in the formation in southwestern Florida. Because the Suwannee, like the Ocala, cannot be divided everywhere, the two facies have not been delineated in this report.

The upper part of the Suwannee has been locally silicified, and this chert-rich horizon was named the Flint River Formation in Georgia. These silicified beds are rarely found in the subsurface and appear to merely represent local diagenetic conditions rather than a widespread mappable variation within the Suwannee. The term Flint River is accordingly not considered to be a valid formational name in this report.

The upper part of the Suwannee in the Georgia subsurface commonly consists of medium to coarsely crystalline, light-brown to honey-colored, saccharoidal, vuggy dolomite. The erosional remnants of Suwannee preserved as outliers several miles distant from the main bodies of Oligocene rocks (pl. 10) and consisting of either limestone or dolomite show that marine Oligocene strata once covered the entire study area. Locally, the cast-and-mold facies of the Suwannee contains fine-grained sand. Very locally, the micritic pelletal facies contains trace amounts of fine- to medium-grained, light- to dark-brown phosphate. In outcrop, the Suwannee locally weathers to a nodular, rubbly surface owing to the removal of layers, lenses, and stringers of soft argillaceous limestone.

The Suwannee grades northward in northeastern Georgia and South Carolina into part of the Cooper Formation by the addition of clay and sand and the loss of limestone. Westward, across panhandle Florida and southern Alabama, the Suwannee appears to grade into the lower part of the Bucatunna Formation. In that area, the Suwannee consists of tan limestone, dolomitic limestone, and light-colored calcareous clay. Some of these beds were called "Byram" or "Glendon" by early workers (Cooke and Mossum, 1929; Cooke, 1945) primarily on the basis of their stratigraphic position. Some faunal aspects of the Suwannee in Florida are Chickasawhayan (late Oligocene); others are Vicksburgian (early Oligocene). The unit is thus interpreted in this report as spanning both ages (pl. 2). The Suwannee in Georgia is thought to be late Oligocene (Huddlestun, 1981).

Microfauna considered characteristic of the Suwannee include the larger Foraminifera *Lepidocyclina leonensis* Cole and *L. parvula* Cole as well as the small Foraminifera *Pararotalia byramensis* Cushman and *P. mexicana mecatepecensis* Nutall, which are closely related. Although the genus *Miogypsina* ranges into younger strata in the central Gulf Coast, it does not occur above the top of the Suwannee in the study area. The larger Foraminifera *Discorinopsis gunteri* Cole, *Dictyoconus cookei* (Moberg), and *Coscinolina floridana* Cole are commonly found in the Suwannee, but these three species are also found lower in the section in the middle Eocene Avon Park Formation. Some authors think that these species have been reworked from the Avon Park into the Suwannee. Others think that they are merely long-ranging species that are "facies seekers." That is, their reappearance in the Suwannee means nothing more than the reestablishment of environmental conditions like those in which the Avon Park was deposited. Most individuals of these three species from the Suwannee examined during this study appeared fresh and unaltered, and the species are widespread throughout the cast-and-mold facies of the formation. In addition, there is no apparent Avon Park source from which these fossils could have been reworked. The isolated patches of Avon Park that are exposed through a cover of upper Eocene sediments (pl. 8) are too small and too scattered to provide a source from which these widely distributed Foraminifera could have been reworked into the Suwannee. This author therefore believes that these are long-ranging species indigenous to the Suwannee Limestone.

Bumpnose, Red Bluff, and Forest Hill Formations

In panhandle Florida, the Oligocene Series thickens considerably (pl. 11) and becomes increasingly clastic westward. In addition, some carbonate units that are older than the Suwannee are present at the base of the Oligocene (pl. 2). One such unit is the Bumpnose Formation, a name applied by Moore (1955) to a soft, white, somewhat glauconitic, highly fossiliferous (pelecypod and gastropod casts and molds and bryozoan and foraminiferal remains) limestone that crops out in central Jackson County, Fla. Moore thought that the Bumpnose represented the uppermost part of the late Eocene but recognized that many of its faunal elements were Oligocene. Subsequent work by Hazel and others (1980) confirmed the findings of MacNeil (1944) and Cooke (quoted by Moore, 1955, p. 38) that the beds that Moore called Bumpnose correlate with the Red Bluff Formation of Alabama of known Oligocene age. The Bumpnose in its type area is very likely a transitional unit between the late Eocene and early Oligocene. The Bumpnose Formation, however, is placed in the Oligocene in this report because carbonate rocks in western Alabama that are in the same stratigraphic position as the Bumpnose and that can be shown to correlate with it are of Oligocene age (Hazel and others, 1980).

The Bumpnose grades northwestward into the Red Bluff Formation, which is mostly dark-gray to brown, fossiliferous, glauconitic clay that contains some iron-

UPPER CONFINING UNIT

Over much of the study area, the Floridan aquifer system is overlain by an upper confining unit that consists mostly of clastic rocks but locally contains much low-permeability limestone and dolomite in its lower parts. In places, the upper confining unit has been removed by erosion, and the Floridan either crops out or is covered by only a thin veneer of permeable sand that is part of the surficial aquifer. Because the lithology and thickness of the upper confining unit are highly variable, the unit retards the vertical movement of water between the surficial aquifer and the Floridan aquifer system in varying degrees. Where the upper confining unit is thick or where it contains much clay, leakance through the unit is much less than where it is thin or highly sandy. In these thick or clay-rich areas, therefore, water in the surficial aquifer moves mostly laterally and is discharged into surface-water bodies rather than moving downward through the upper confining unit (when the head differential is favorable) to recharge the Floridan aquifer system.

The upper confining unit may be breached locally by sinkholes and other openings that serve to connect the Floridan aquifer system directly with the surface. These sinkholes are for the most part found where the thickness of the upper confining unit is 100 ft or less. They appear to result from the collapse of a relatively thin cover of clastic materials into solution features developed in the underlying limestone of the Floridan aquifer system rather than from the solution of limestone beds within the upper confining unit itself. The upper confining unit is generally more sandy where it is less than 100 ft thick because these relatively thin areas represent upbasin depositional sites where coarser clastic rocks were laid down. Plate 25 shows the extent and thickness of the upper confining unit. The maximum measured thickness of the unit is about 1,890 ft in well ALA-BAL-30 in Baldwin County, Ala. The maximum contoured thickness is 1,900 ft. Plate 25 also shows areas where water in the Floridan aquifer system occurs under unconfined, thinly confined (thickness of upper confining unit between 0 and 100 ft), and confined conditions.

The upper confining unit includes all beds of late and middle Miocene age, where such beds are present. Locally, low-permeability beds of post-Miocene age are part of the upper confining unit. Over most of the study area, middle Miocene and younger strata consist of complexly interbedded, locally highly phosphatic sand, clay, and sandy clay beds, all of which are of low permeability in comparison with the underlying limestone of the Floridan aquifer system. Locally, low-permeability carbonate rocks that are part of the lower Miocene Tampa Limestone or of the Oligocene Suwannee Limestone are included in the upper confining unit. Very locally, in the West Palm Beach, Fla., area, the uppermost beds of rocks of late Eocene age are of low permeability and are included in the upper confining unit.

Parker and others (1955) and Stringfield (1966) included basal beds of the Hawthorn Formation in their Floridan and principal artesian aquifers where those beds are permeable. In a few isolated cases (for example, in Brevard County, Fla.), the lowermost Hawthorn strata are indeed somewhat permeable, but their permeability is considerably less than that of the underlying Floridan aquifer system, as Parker and others (1955, p. 84) recognized. Locally, in parts of southwestern Florida (Sutcliffe, 1975; Boggess and O'Donnell, 1982) and west-central peninsular Florida (Ryder, 1982), permeable zones within the Hawthorn Formation are an important source of ground water over a one- or two-county area. Although some of these permeable zones are limestones, their transmissivity is at least an order of magnitude less than that of the Floridan aquifer system, and they are separated from the main body of permeable limestone (Floridan) by thick confining beds. Because of their limited areal extent, relatively low permeability, and vertical separation from the Floridan aquifer system practically everywhere, water-bearing Hawthorn limestones are excluded from the Floridan in this report.

Where the limestone and dolomite of the Floridan crop out, a clayey residuum may form over the carbonate rocks as a result of chemical weathering that dissolves the carbonate minerals and concentrates trace amounts of clay that are in them. Such residumm is particularly well developed in the Dougherty Plain area of southwestern Georgia (Hayes and others, 1983). Although this residuum is a low-permeability material and may very locally form a semiconfining layer above the limestone, it is usually thin and laterally discontinuous. Accordingly, the clayey residuum is not included in this report as part of the upper confining unit of the Floridan aquifer system.

Because the rocks that comprise the upper confining unit vary greatly in lithology, are complexly interbedded, and for the most part are of low permeability, little is known about their hydraulic characteristics. Where clay beds are found in the Hawthorn Formation, they are usually very effective confining beds. Vertical hydraulic conductivity values for Hawthorn clays, as established from core analysis and from aquifer tests, range from 1.5×10^{-2} ft/d (Hayes, 1979) to 7.8×10^{-7} ft/d (Miller and others, 1978). Where sandy beds of the Hawthorn comprise a local aquifer, transmissivity values for the sand range as high as

NUS CORPORATION AND SUBSIDIARIES | *TELECON NOTE*

REFERENCE # 24

CONTROL NO.	**DATE:** October 8, 1990	**TIME:** 1400

DISTRIBUTION:

AMAX Phosphate

BETWEEN: Arnold Becken	**OF:** Hillsborough County Water Distribution	**PHONE:** (813) 968-4825

AND: Maureen Gordon, NUS Corporation

M. Gordon

DISCUSSION:

The water lines for Hillsborough County do not cross the Manatee River. They end south of Ruskin.

Southwest Florida
Water Management District

REFERENCE # 25

2379 Broad Street (U.S. 41 South) Brooksville, Florida 34609-6899
Phone (904) 796-7211 or 1-800-423-1476 SUNCOM 628-4150

September 27, 1990

Ms. Maureen M. Gordon
NUS, Corporation
1927 Lakeside Pkwy., Suite 614
Tucker, Georgia 30084

SUBJECT: Well Construction Permit Listing

Dear Ms. Gordon

Enclosed you will find copies of the above referenced listing for the areas outlined in your letter dated September 6, 1990.

If I can be of any further assistance, please contact this office.

Sincerely,

JAMES P. MARSHALL
Well Construction
Permit Coordinator

/JPM

NUS
CORPORATION

1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404-938-7710

C-586-9-0-55

September 6, 1990

Mr. Jim Marshal
2379 Brood Street
Brooksville, FL 34609-6899

Dear Mr. Marshal:

I am doing a site investigation of AMAX Phosphate Facility (Royster) in Palmetto for Superfund. Could you please send me a listing of all wells (private, municipal, industrial) within a 4-mile radius. The latitude of the site is 27°37'24" and the longitude, 82°31'54'. The following is a listing of Sections, Townships, and Ranges included in the 4-mile radius:

Sections 13-36, Township 32S, Range 18E
Sections 1-36, Township 33S, Range 18E
Sections 1, 12, 13, 23-27, 34, 35, Township 33S, Range 17E

Very truly yours,

Maureen Gordon

Maureen M. Gordon, Ph.D.
Project Manager

Approved:

MMG/tb

BY: COUNTY: BASIN: S: 1 - 36 T:33 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
447081	N	1376	D	21	081	0 0	303318	4	*** CANCELLED ***													ADAMS, DURAND J.
701204	C	1627	D	21	081	0 0	303318	4														HOWELL, ERNEST
449171	I	2831	D	21	081	0 0	303318	5														ROBERTSON, KENNETH
700805	C	1627	E	21	081	0 0	303318	4														GENERAL ASPHALT CO OF BRADENTON
445302	N	1979	0	21	081	0 0	303318	6	*** CANCELLED ***													SWFWMD
445301	I	1979	0	21	081	0 0	303318	8	236	321		0	R	0						0000	NO	SWFWMD
445304	I	1979	0	21	081	0 0	303318	8	1047	1260	Y	65	R	0						0000	NO	SWFWMD
448222	N	1276	0	21	081	0 0	303318	8	*** CANCELLED ***													SWFWMD
447756	N	2502	Y	21	081	0 0	303318	4	*** CANCELLED ***													TIPE LAKE R.V.
700886	C	1051	A	21	081	0 0	313318	4														LAURENT, H. S.
700899	C	1051	A	21	081	0 0	313316	4														LEGRANGE, W. A.
447118	N	1051	D	21	081	0 0	313318	4	*** CANCELLED ***													LAWRENCE - DUCKWORTH
700851	C	1051	D	21	081	0 0	313318	4														YANKEE, ROBERT
447965	I	1376	D	21	081	0 0	313318	5	120	200	Y	18	R	23						0000	NO	FIRST CHURCH OF GOD
470294	I	2987	0	21	081	0 0	313318	2	2	15	Y	2	A	0						0000	NO	ROYAL CROWN BOTTLING CO.
470295	I	2987	0	21	081	0 0	313318	2	2	15	Y	2	A	0						0000	NO	ROYAL CROWN BOTTLING CO.
470296	I	2987	0	21	081	0 0	313318	2	2	15	Y	2	A	0						0000	NO	ROYAL CROWN BOTTLING CO.
470297	I	2987	0	21	081	0 0	313316	2	2	15	Y	2	A	0						0000	NO	ROYAL CROWN BOTTLING CO.
701053	C	1627	Z	21	081	0 0	313318	3														CHAUNCEY, JERRY
700674	C	1627	A	21	081	0 0	323318	4														BOWEN FAMILY TRUST
449462	I	1627	A	21	081	0 0	323318	5	102	470	Y	27	R	17						0000	NO	DAKIN, SHERBURN
700696	C	1627	A	21	081	0 0	323318	6														CREATIVE GROWERS, INC.
300036	C	1627	D	21	081	0 0	323318	4	62	190	N	0	C	19			B		76-005		NO	HUGHES, C. E. & EDWARDS, LEE
300008	C	1627	D	21	081	0 0	323318	4	31	190	N	0	C	19	A	Q	F		76-009		NO	HUGHES, CURTIS W.
449388	I	2870	A	21	081	0 0	343318	4	90	205		0	C	18						0000	NO	ARNESON
447189	I	1627	A	21	081	0 0	343318	5	199	440	Y	55	R	0						0000	NO	ARMSTRONG, MIKE
445708	I	1627	A	21	081	0 0	353318	4	41	344	Y	5	R	15						0000	NO	MASTERS MERCHANDISE MART
446766	N	1051	A	21	081	0 0	353318	4	*** CANCELLED ***													POWELL, JACK
701093	C	1627	A	21	081	0 0	353318	4														CHADSEY, TAYLOR
701182	C	1627	A	21	081	0 0	353318	4														CHADSEY JR., TAYLOR B.
464078	I	2587	0	21	081	0 0	363318	2														UNION 76
464080	I	2587	0	21	081	0 0	363318	2														UNION 76
464082	I	2587	0	21	081	0 0	363318	2														UNION 76
464084	I	2587	0	21	081	0 0	363318	2														UNION 76

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:33 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	B NA BG RS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
300418	C	1627	D	21	081	0 0	273318	4	90	182	N	0	T	17	A	O	B		77-103		NO	YOUNG, SONNY
300461	C	1627	D	21	081	0 0	273318	4	33	172	N	0	T	35			B		77-175		NO	FINLEY, JOHN
300494	C	1627	D	21	081	0 0	273318	4	80	195	N	0	C	30	A	O	B		77-244		NO	SCHULTZ, NEIL E.
300616	C	1627	D	21	081	0 0	273318	4	126	390	N	0	T	18	A	K	C		77-436		NO	MORAN, CHARLES
445083	I	1627	D	21	081	0 0	273318	4	113	185		0	C	20						0000	NO	ARMSTRONG MARSHALL
446619	I	1627	D	21	081	0 0	273318	5	113	240	Y	28	R	12						0000	NO	ARMSTRONG, MIKE
446906	I	1627	D	21	081	0 0	273318	5	109	295		0	R	15						0000	NO	BARCO, LULA MAE
447736	N	1627	H	21	081	0 0	273318	4	*** CANCELLED ***													STEVENS, JOHN
447364	N	2368	0	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. SOLID WASTE DEPT.
447366	N	2366	0	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. SOLID WASTE DEPT.
447367	N	2366	0	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. SOLID WASTE DEPT.
447368	I	2368	0	21	081	0 0	273316	2														MANATEE CO. SOLID WASTE DEPT.
463971	N	2368	0	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463972	N	2368	0	21	115	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463974	N	2368	0	21	115	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463975	N	2368	0	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463976	N	2368	0	21	081	0 0	273318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
470261	I	2831	0	21	081	0 0	273318	2														BLOSSEM GROVES
470263	I	2831	0	21	081	0 0	273318	2														BLOSSEM GROVES
470264	I	2831	0	21	081	0 0	273318	2														BLOSSEM GROVES
470265	I	2831	0	21	081	0 0	273318	2														BLOSSEM GROVES
445136	I	1627	A	21	081	0 0	283318	4	91	290		0	C	6						0000	NO	BOHANAN MARJORIE
470175	I	2874	A	21	081	0 0	283318	4														DEWSACK
700976	C	1365	A	21	081	0 0	283318	4														DUBATS, DON
448859	I	2831	A	21	081	0 0	283318	5	40	330	Y	14	R	5						0000	NO	SPERG, MARK
301638	C	1299	A	21	081	0 0	283318	8	311	960	N	0	C	11	B				78-440		NO	PHARES JR., CLIFTON J.
701199	C	1627	D	21	081	0 0	283318	4														KILLINGSWORTH, JIM
301432	E	1627	A	21	081	0 0	293318	4	73	442		0	T	12	A	P	C		000000		NO	BOWEN,B
301438	E	1627	A	21	081	0 0	293318	4	56	383		0	T	9	A	M	C		000000		NO	GARDNER,D
447674	I	2840	A	21	081	0 0	293318	4	94	165		0	C	8						0000	NO	HARPLEY
700058	C	1627	A	21	081	0 0	293318	4														BOWEN, BEN
700063	C	1627	A	21	081	0 0	293318	4														GARDNER, DON
446516	I	1627	A	21	081	0 0	293318	5	81	295	Y	22	R	24						0000	NO	HEATH
448441	I	1627	B	21	081	0 0	293318	5	60	340	Y	18	R	10						0000	NO	SHADOW BROOK MOBILE HOME CONDO.
701017	C	1627	H	21	081	0 0	293318	10														BOWEN, BEN F.
448443	I	1627	J	21	081	0 0	293318	5	60	340	Y	18	R	7						0000	NO	SHADOW BROOK MOBILE HOME CONDO.
447365	N	2368	0	21	081	0 0	293318	2	*** CANCELLED ***													MANATEE CO.SOLID WASTE DEPT.
447375	I	1627	A	21	081	0 0	303318	5	42	160	Y	13	R	28						0000	NO	MC HENRY, JOHN
445069	I	1627	D	21	081	0 0	303318	4	43	137		0	C	1						0000	NO	DRAKE GAYLAND

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:33 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	SWL (STATIC WATER LEVEL)	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
300040	C	1627	D	21	081	0 0	193318	4	44	110	N	0	C	28	A		F		76-097		NO	FRISBIE, ANNIE
302945	C	1013	D	21	081	0 0	193318	4	40	265		0	R	9					79-194		NO	WARD, JACK
446557	I	1360	D	21	081	0 0	193318	4	30	233		0	C	2						0000	NO	CLOSE BILL
446558	I	1360	D	21	081	0 0	193318	4	30	170		0	C	2						0000	NO	CLOSE BILL
447770	N	1737	D	21	081	0 0	193318	4	*** CANCELLED ***													LOYER, VAL
700922	C	1627	D	21	081	0 0	193318	4														HORNSBY, GARY
701207	C	1013	D	21	081	0 0	193318	4														FRENCH, TIM
701226	C	1627	D	21	081	0 0	193318	4														SMITH, CARL
464430	I	1627	D	21	081	0 0	193318	5	60	200	Y	18	R	10						0000	NO	WYMAN,GREEN & BLALOCK/DOOM,DON
448674	I	2870	H	21	081	0 0	193318	8														WINTERSIT PARK
448837	I	1627	L	21	081	0 0	193318	6	100	100	Y	27	R	0						0000	NO	SIPE, MIKE
448562	I	1974	O	21	081	0 0	193318	3														SWFWMD
448563	I	1974	O	21	081	0 0	193318	3														SWFWMD
472938	I	1627	A	21	081	0 0	203318	5	60	340	Y	18	R	21						0000	NO	HUTTINGER, CAROL
701119	C	1627	D	21	081	0 0	203318	4														VER STRATE, CHRIS
446613	I	1627	D	21	081	0 0	203318	5	40	100	Y	12	R	13						0000	NO	AYRES WILLIAM
470229	I	1627	D	21	081	0 0	203318	5	93	190	Y	16	R	68						0000	NO	STINSON, KIM
447239	N	1979	Y	21	081	0 0	203318	3	*** CANCELLED ***													SWFWMD
301608	C	1627	A	21	081	0 0	213318	4	276	453	N	0	T	11	B	H	B		78-308		NO	GOEBEL, CLYDE
396135	C	2263	A	15	053	0 0	213318	4	84	120	N	0	C	0					000000		NO	DRUMMOND, DAN
447762	N	1376	D	21	081	0 0	213318	5	*** CANCELLED ***													STEVENS, JOHN
700622	C	1360	I	21	081	0 0	213318	4														AMERSON, ROY
463977	N	2368	O	21	081	0 0	223318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
463978	N	2368	O	21	081	0 0	223318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
470256	I	2831	O	21	081	0 0	223318	2														BLOSSEM GROVES
470257	I	2831	O	21	081	0 0	223318	2														BLOSSEM GROVES
470258	I	2831	O	21	081	0 0	223318	2														BLOSSEM GROVES
470259	I	2831	O	21	081	0 0	223318	2														BLOSSEM GROVES
470252	I	2831	O	21	081	0 0	243318	2														MC CLURE FARMS
470253	I	2831	O	21	081	0 0	243318	2														MC CLURE FARMS
447492	I	1627	D	21	081	0 0	253318	5	40	100	Y	12	R	16						0000	NO	ALLIGOOD, MIKE
701108	C	1627	A	21	081	0 0	263318	10														PURSLEY TURF FARMS
448179	I	1376	I	21	081	0 0	263318	6	340	700	Y	25	R	45						0000	NO	MANATEE CO. UTILITIES
463973	N	2368	O	21	115	0 0	263318	2	*** CANCELLED ***													MANATEE CO. UTILITIES DEPT.
470266	I	2831	O	21	081	0 0	263318	2														BLOSSEM GROVES
470267	I	2831	O	21	081	0 0	263318	2														BLOSSEM GROVES
470268	I	2831	O	21	081	0 0	263318	2														BLOSSEM GROVES
470269	I	2831	O	21	081	0 0	263318	2														BLOSSEM GROVES
447752	N	1376	Y	21	081	0 0	263318	6	*** CANCELLED ***													MANATEE CO.UTILITIES

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:33 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BNA BGRS	METHOD	SWL TAE ATV TEE IRL C	SPC CAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
447617	N	1737	D	21	081	0 0	093318	4	*** CANCELLED ***													MAGINESS, JOHN & KATY
448655	I	1376	Y	21	081	0 0	093318	10	0	250		0	C	0						0000	NO	REEDER RANCH
449152	I	1013	A	21	081	0 0	103318	4														BOND, JIM
700762	C	1013	D	21	081	0 0	103318	4														REEDER, GRAHAM
446970	N	1376	A	21	081	0 0	123318	4	*** CANCELLED ***													SHIMANDLE, RICHARD
470250	I	2831	0	21	081	0 0	123318	2														MC CLURE FARMS
470251	I	2831	0	21	081	0 0	143318	2														MC CLURE FARMS
470254	I	2831	0	21	081	0 0	143318	2														MC CLURE FARMS
470255	I	2831	0	21	081	0 0	143318	2														MC CLURE FARMS
448613	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448614	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448615	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448616	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448617	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
448618	N	1945	0	21	081	0 0	153318	2	*** CANCELLED ***													PIONEER OIL COMPANY
447121	I	1627	A	21	081	0 0	163318	5	202	365	Y	55	R	25						0000	NO	PURSLEY GRASS
471253	I	1627	A	21	081	0 0	163318	8	315	597	Y	75	R	27						0000	NO	DESERET FARMS (SLEIGHT, DON)
449172	I	2870	D	21	081	0 0	163318	4	65	305		0	C	9						0000	NO	IMPERIAL FARMS INC.
700705	C	1627	D	21	081	0 0	163318	4														4 STAR FISH FARMS
301462	E	1627	A	21	081	0 0	173318	4	89	242		0	T	42	A	M	C		000000		NO	SALEM,J
700088	C	1627	A	21	081	0 0	173318	4														SALEM, JOSEPH
447455	I	1627	A	21	081	0 0	173318	5	105	200	Y	28	R	64						0000	NO	BELL, JAMES
301610	C	1627	D	21	081	0 0	173318	4	93	240	N	0	T	35		M	B		78-311		NO	BEASLEY, RANDY
445839	N	1376	D	21	081	0 0	173318	4	*** CANCELLED ***													DUBOIS DON
447501	N	1974	D	21	081	0 0	173318	4	*** CANCELLED ***													CLOSE, BILL
448047	I	1360	D	21	081	0 0	173318	4	47	280		0	C	1						0000	NO	CLEARY, KEN
449329	I	1376	D	21	081	0 0	173318	4	62	160		0	C	0						0000	NO	WILLIAMS, HOWARD
449567	I	1376	D	21	081	0 0	173318	4	83	160		0	C	48						0000	NO	JORDEN, DOUG
700914	C	1627	D	21	081	0 0	173318	4														MOTT, MERLE
701060	C	1627	D	21	081	0 0	173318	4														LEGGETT, DREW
445770	I	1627	A	21	081	0 0	183318	5	57	350	Y	4	R	15						0000	NO	GREINKE DAVID
301557	C	1627	D	21	081	0 0	183318	4	63	302		0	T	11	A				78-236		NO	LEE, MELVIN
445140	I	1627	D	21	081	0 0	183318	4	52	290		0	C	12						0000	NO	FORTWENDEL CLETE
445435	I	1627	D	21	081	0 0	183318	4	57	300		0	C	0						0000	NO	ROBUCK ROGER
447812	I	1051	D	21	081	0 0	183318	4	263	300		0	C	14						0000	NO	GADWELL, AMY
501260	I	1366	D	21	081	0 0	183318	4	60	262		0	C	2				A		0000	NO	HEMLER, KENT
501340	I	1376	D	21	081	0 0	183318	4														RICHES
446320	I	1627	D	21	081	0 0	183318	5	60	390	Y	18	R	7						0000	NO	ADAMS LARRY
701217	C	1627	A	21	081	0 0	193318	4														SIPE, MIKE

DATE 9/27/90 5:16:39 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

WELL CONSTRUCTION PERMITTING

R0B0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 36 T:33 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BNBR AGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
445151	I	1051	A	21	081	0 0	023318	3	33	118		0	C	5						0000	NO	TOPGUN H.G.
435606	N	2987	O	21	081	0 0	023318	2	*** CANCELLED ***													ELSBERRY INC.
435607	N	2987	O	11	081	0 0	023318	2	*** CANCELLED ***													ELSBERRY INC.
435608	N	2987	O	21	081	0 0	023318	2	*** CANCELLED ***													ELSBERRY INC.
435609	N	2987	O	21	081	0 0	023318	2	*** CANCELLED ***													ELSBERRY INC.
470119	N	2088	A	21	081	0 0	033318	4	*** CANCELLED ***													EZSBERRY, BRUCE
449330	I	1376	I	21	081	0 0	053318	12	105	610		0	C	3						0000	NO	CANNON, HARRY
449332	I	1376	I	21	081	0 0	053318	12	310	600		0	C	3						0000	NO	CONSOLIDATED MINERAL INC.
700627	C	2073	T	21	081	0 0	053318	4														USGS
447428	I	1360	A	21	081	0 0	063318	4	32	100		0	C	28						0000	NO	LOGGINS, CORBIN
448625	I	1627	A	21	081	0 0	063318	5	92	370	Y	25	R	0						0000	NO	DEPARTMENT OF NATURAL RESOURCES
448875	N	2684	O	21	081	0 0	063318	2	*** CANCELLED ***													MANATEE CO. FACILITIES MGMT.
448876	N	2884	O	21	081	0 0	063318	2	*** CANCELLED ***													MANATEE CO. FACILITIES MGMT.
448879	N	2884	O	21	081	0 0	063318	2	*** CANCELLED ***													MANATEE CO FACLILTIES MGMT.
448880	N	2884	O	21	081	0 0	063318	2	*** CANCELLED ***													MANATEE CO. FACILITIES MGMT.
464170	I	2884	O	21	081	0 0	063318	2	6	20	Y	1	A	4						0000	NO	MANATEE CO.FACILITIES MANAGE.
374340	C	0001	T	21	081	0 0	063318	2	15	22	N	0	C	0					TF1531		NO	TAMPA ELECTRIC CO
306585	C	1627	A	21	081	0 0	073318	3	32	50	N	0	C	2	A	M	C		77-391		NO	BARCO, W. S.
300037	C	1627	A	21	081	0 0	073318	4	47	390	N	0	C	12	A	M	G		76-090		NO	NICHOLS, DR FRED
448361	I	1627	A	21	081	0 0	073318	4	63	260	Y	14	R	0						0000	NO	SWITZER, MOREY(STARLITE CONST.)
469980	I	9033	A	21	081	0 0	073318	4	0	38	Y	5	R	0						0000	NO	ROYSTER, CORP.
448698	N	2858	O	21	081	0 0	073318	2	*** CANCELLED ***													COMMERCIAL CARRIER CORP.
448699	N	2858	O	21	081	0 0	073318	2	*** CANCELLED ***													COMMERCIAL CARRIER CORP.
448700	N	2858	O	21	081	0 0	073318	2	*** CANCELLED ***													COMMERCIAL CARRIER CORP.
448701	N	2858	O	21	081	0 0	073318	2	*** CANCELLED ***													COMMERCIAL CARRIER CORP.
449666	I	2406	O	21	081	0 0	073318	2														FLORIDA POWER CORPORATION
449667	I	2406	O	21	081	0 0	073318	2														FLORIDA POWER CORPORATION
449668	I	2406	O	21	081	0 0	073318	2														FLORIDA POWER CORPORATION
449669	I	2406	O	21	081	0 0	073318	2														FLORIDA POWER CORPORATION
470227	I	9033	O	21	081	0 0	073318	2	45	65	Y	5	R	0						0000	NO	ROYSTER COMPANY
445134	I	1627	A	21	081	0 0	083318	4														DAVIS HOYT
700356	C	1627	D	21	081	0 0	083318	3														COCHRAN, ELBERT LEE
701148	C	1013	D	21	081	0 0	083318	4														AUSTIN, BOB
448357	N	2372	O	21	081	0 0	083318	4	*** CANCELLED ***													AMAX CHEMICAL CORP.
700628	C	2073	T	21	081	0 0	083318	4														USGS
700629	C	2073	T	21	081	0 0	083318	4														USGS
700630	C	2073	T	21	081	0 0	083318	4														USGS
700841	C	2073	T	21	081	0 0	083318	4														USGS
449237	I	1376	A	21	081	0 0	093318	10	340	815		0	C	46						0000	NO	REEDE RANCH

WELL CONSTRUCTION PERMITTING

R0B0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
321842	H	1336	B	11	057	0 0	133218	3	52	206	N	0	C	6					000000		NO	WM CLARK
360809	C	1336	B	11	057	4 1	133218	3	62	215	Y	6	C	0					000000		NO	WHISMAN, CLIFFORD F.
351555	E	1477	B	11	057	0 0	133218	4	230	230	N	0	C	0					000000		NO	MORGAN, VERNON
416627	I	2251	D	11	057	0 0	133218	2	147	242	Y	8	R	0						0000	NO	CRISSEY, FLORENCE
307762	E	0000	D	11	057	1 1	133218	3	53	213		0	C	7					000000		NO	M H SUMNER
320752	E	0000	D	11	057	4 1	133218	3	77	242		0	C	6					000000		NO	LEON LIMOGE
323223	E	1336	D	11	057	0 0	133218	3	87	200		0	C	10					000000		NO	F DIAZ
326929	E	1477	D	11	057	0 0	133218	3	36	210		0	C	12					000000		NO	L DAVIS
326930	E	1477	D	11	057	0 0	133218	3	148	205		0	C	12					000000		NO	D L GIBSON
332982	E	1160	D	11	057	0 0	133218	3	53	187		0	C	12					000000		NO	D SIMPSON
333553	H	1336	D	11	057	0 0	133218	3	58	212		0	C	7					000000		NO	DEBLY J D
338943	E	1160	D	11	057	0 0	133218	3	63	185		0	C	1					000000		NO	COOK,R L
338944	E	1160	D	11	057	0 0	133218	3	59	180		0	C	1					000000		NO	WALKER,D I
376125	C	1336	D	11	057	1 4	133218	3	70	200	N	0	C	0					000000		NO	CROWDER, CHARLES H.
397715	C	1336	D	11	057	0 0	133218	3	64	210	N	0	C	0					000000		NO	HERBECK, HOWARD
398928	C	1336	D	11	057	1 4	133218	3	67	210	N	0	C	0					000000		NO	BHUINSMA, THYS
400476	C	1336	D	11	057	4 1	133218	3	67	210	N	0	C	10					000000		NO	KOJIS, GEORGE
406371	E	1336	D	11	057	1 4	133218	3	84	210	N	0	C	0					000000		NO	WHITMAN,JERRY
332778	E	1627	D	11	057	0 0	133218	4	54	115		0	C	3	A	K	C	H	000000		NO	B RUSH
336250	E	1094	D	11	057	0 0	133218	4	105	183		0	R	0					000000		NO	HOWARD J
439683	I	1477	D	11	057	4 2	133218	4	63	200		0	C	18						0023	NO	DRIGGERS, MARGARET
475153	I	1336	D	11	057	0 0	133218	4	84	220		0	C	5						0000	NO	DANIELS, DAVID
499395	I	2088	D	11	057	0 0	133218	4	39	185		0	C	0						0000	NO	NETTGEN, ELMER
503174	I	1477	H	11	057	4 4	133218	3														GIBSON, W. W.
433885	I	2858	0	11	057	1 4	133218	2	2	12	N	0	A	0						0000	NO	PAYLESS OIL
433886	I	2858	0	11	057	1 4	133218	2	2	12	N	0	A	0						0000	NO	PAYLESS OIL
433887	I	2858	0	11	057	1 4	133218	2	2	12	N	0	A	0						0000	NO	PAYLESS OIL
433888	I	2858	0	11	057	1 4	133218	2	2	12	N	0	A	0						0000	NO	PAYLESS OIL
444245	I	2587	0	11	057	0 0	133218	2	2	12		0	A	4						0000	NO	HANDY FOOD STORES
444246	I	2587	0	11	057	0 0	133218	2	2	12		0	A	4						0000	NO	HANDY FOOD STORES
444247	I	2587	0	11	057	0 0	133218	2	2	12		0	A	4						0000	NO	HANDY FOOD STORES
444248	I	2587	0	11	057	0 0	133218	2	2	12		0	A	4						0000	NO	HANDY FOOD STORES
332091	E	1477	A	11	057	0 0	143218	6	63	571		0	C	1					000000		NO	RAINBOW FLO
442683	I	1336	A	11	057	3 1	143218	6	55	525	N	0	C	20						0000	NO	CONSTANTINE TRUST, T. J.
383721	C	1057	A	11	057	4 4	143218	8	63	325	N	0	C	4					000000		NO	ELSBERRY BROTHERS INC.
406419	E	2088	A	11	057	0 0	143218	10	80	780	Y	0	R	2					000000		NO	CARLTON, C DENNIS
420163	I	1336	B	11	057	0 0	143218	3	70	200	Y	6	C	0						0000	NO	RAINBOW FLOWERS INC.
339076	H	1477	B	11	057	0 0	143218	4	63	201	Y	2	C	6					000000		NO	RAINBOW FLW
308998	E	0000	D	11	057	0 0	143218	3	40	130		0	C	0					000000		NO	P MOSS

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	B NA DG RS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
406372	E	1336	D	11	057	1 4	143218	3	65	220	N	0	C	0					000000		NO	MITUSINA,MIRO
338801	E	1056	D	11	057	0 0	143218	4	81	195		0	C	0					000000		NO	ALLSTATE HM
370638	C	1056	D	11	057	4 4	143218	4	40	190		0	C	0					000000		NO	ALLSTATE HOMES
389709	C	1043	D	11	057	0 0	143216	4	84	210	N	0	T	0					000000		NO	ESPER, RICHARD
484433	I	2088	D	11	057	0 0	143218	4	84	320		0	C	10						0000	NO	WINDGATE, BUD
331899	E	1477	I	11	057	0 0	143218	3	44	176		0	C	0					000000		NO	RAINBOW FLO
497764	I	2898	0	11	057	1 1	143218	2	10	15	Y	3	A	0						0000	NO	LEISCY SHELL CORP.
311162	E	0000	D	11	057	3 4	153218	3	37	170		0	C	0					000000		NO	B PATE
386567	C	2088	D	11	057	0 0	153218	4	72	190	N	0	C	1					000000		NO	REMKE DEVELOPMENT
415394	I	1974	0	11	057	0 0	153218	2	20	30	Y	2	R	0						0001	NO	LEISEX SHELL PIT
415395	I	1974	0	11	057	0 0	153218	2	20	30	Y	2	R	3						0002	NO	LEISEX SHELL PIT
430960	I	1974	0	11	057	0 0	153216	2	20	30	Y	3	R	0						0000	NO	SHELL, LEISEY
473606	I	2587	0	11	057	0 0	153218	2	10	10	Y	1	A	5						0000	NO	LEISEY SHELL PIT
473607	I	2587	0	11	057	0 0	153218	2	10	10	Y	1	A	5						0000	NO	LEISEY SHELL PIT
473608	I	2587	0	11	057	0 0	153218	2	10	10	Y	1	A	5						0000	NO	LEISEY SHELL PIT
473609	I	2587	0	11	057	0 0	153218	2	10	10	Y	1	A	5						0000	NO	LEISEY SHELL PIT
476132	I	2896	0	11	057	4 2	153218	2	25	25	Y	2	A	12						0000	NO	LEISEY SHELL PIT
476133	I	2898	0	11	057	0 0	153218	2	25	25	Y	2	A	4						0000	NO	LEISEY SHELL PIT
476134	I	2898	0	11	057	0 0	153218	2	25	25	Y	2	A	4						0000	NO	LEISEY SHELL PIT
485125	I	2898	0	11	057	2 2	153218	2	5	25	Y	2	R	0						0000	NO	LEISEY SHELL PIT
485127	I	2898	0	11	057	2 1	153218	2	4	25	Y	2	A	0						0000	NO	LEISEY SHELL PIT
415401	I	1974	Y	11	057	0 0	153218	2	194	194	Y	12	R	0						0000	NO	LEISEX SHELL PIT
375491	C	2251	Y	11	057	0 0	153218	3	0	0	Y	18		0					000000		NO	HILLSBOROUGH CO PURCHASING DEPT
375492	C	2251	Y	11	057	0 0	153218	3	0	0	Y	15		0					000000		NO	HILLSBOROUGH CO PURCHASING DEPT
375493	C	2251	Y	11	057	0 0	153218	3	0	0	Y	22		0					000000		NO	HILLSBOROUGH CO PURCHASING DEPT
415400	I	1974	Y	11	057	0 0	153218	3	172	172	Y	34	R	0						0000	NO	LEISEX SHELL PIT
491166	I	2898	Y	11	057	3 2	153218	3	25	25	Y	4	R	0						0000	NO	WING, WALTER
491167	I	2896	Y	11	057	3 2	153218	3	0	99	Y	10	R	0						0000	NO	WING, WALTER
415399	I	1974	Y	11	057	0 0	153218	6	458	458	Y	10	R	0						0000	NO	LEISEX SHELL PIT
417346	I	1974	Y	11	057	0 0	153218	6	0	420	Y	9	R	0						0000	NO	LEISEY SHELL PIT
417347	I	1974	Y	11	057	0 0	153218	6	0	394	Y	56	R	0						0000	NO	LEISEY SHELL PIT
417710	I	1974	Y	11	057	0 0	153218	6	446	496	Y	3	R	0						0000	NO	LEISEY SHELL PIT
478329	I	2898	Y	11	057	0 0	153218	6	0	222	Y	25	R	0						0000	NO	W & W ENTERPRISES
485123	I	2896	Y	11	057	4 2	153218	6														LEISEY SHELL PIT
415396	I	1974	Y	11	057	0 0	153218	8	363	383	Y	42	R	0						0000	NO	LEISEX SHELL PIT
415397	I	1974	Y	11	057	0 0	153218	8	179	179	Y	65	R	0						0000	NO	LEISEX SHELL PIT
415398	I	1974	Y	11	057	0 0	153218	8	204	204	Y	10	R	0						0000	NO	LEISEX SHELL PIT
417348	I	1974	Y	11	057	0 0	153218	8	388	388	Y	46	R	0						0000	NO	LEISEY SHELL PIT
427265	I	2405	D	11	057	2 2	163218	4	93	180		0	C	32						0000	NO	HAMMER HOMES

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
434980	I	1232	E	11	057	0 0	193218	6	40	125	Y	15	R	0						0000	NO	MESA CORROSION
349082	N	1509	O	11	057	0 0	213218	4	*** CANCELLED ***													CLAPROOD, VICTOR
338908	H	1336	B	11	057	0 0	223218	4	75	240	Y	5	C	4					000000		NO	HW IL MB PK
473352	I	9028	O	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473353	I	9028	O	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473355	I	9028	O	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473356	I	9028	O	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473357	I	9028	O	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473358	I	9028	O	11	057	0 0	223218	2	5	25	Y	1	A	0						0000	NO	TODD, GEORGE K.SR.
473359	N	9028	O	11	057	0 0	223218	2	*** CANCELLED ***													TODD, GEORGE K.SR.
473360	N	9028	O	11	057	0 0	223218	2	*** CANCELLED ***													TODD, GEORGE K.SR.
349083	N	1509	O	11	057	0 0	223218	6	*** CANCELLED ***													CLAPROOD, VICTOR
349084	N	1509	O	11	057	0 0	223218	8	*** CANCELLED ***													CLAPROOD, VICTOR
413661	E	2502	Y	11	057	0 0	223218	6	26	183		0	R	0					11-207		NO	WILDER CORPORATION OF DELAWARE
458905	I	2088	A	11	057	0 0	233218	4	63	320		0	C	0						0000	NO	TODD, GEORGE
310333	E	0000	A	11	057	1 3	233218	8	159	625		0	C	0					000000		NO	LIESY TODD
323268	H	1336	B	11	057	2 4	233218	4	80	225	N	0	C	25					000000		NO	G TINDALE
337776	H	1160	B	11	057	0 0	233218	4	80	267	Y	9	C	18					000000		NO	SPEEDLINE
353451	C	1094	D	11	057	0 0	233218	2	189	242		0	R	28					000000		NO	YORK, C.
362923	C	1094	D	11	057	0 0	233218	2	126	301		0	R	0					000000		NO	GARNER, MARCUS L.
370069	C	1094	D	11	057	0 0	233218	2	107	253		0	R	14					000000		NO	HOBART, RENA
375122	C	2250	D	11	057	0 0	233218	2	109	232	Y	5	R	0					LOT-24		NO	RODRIGUEZ, MR.
375162	N	2250	D	11	057	0 0	233218	2	*** CANCELLED ***													FOSTER, JOHN
376395	C	2250	D	16	057	0 0	233218	2	106	262	Y	6	R	0					LOT-18		NO	BLANCHARD
377087	C	2250	D	14	057	0 0	233218	2	108	240	Y	6	R	0					LOT-13		NO	CHRISTIE, GREG
378401	C	2250	D	11	057	0 0	233218	2	109	232	Y	5	R	0					LOT-12		NO	BABBITT, IVAN
378888	C	2250	D	11	057	0 0	233218	2	110	242	Y	5	R	0					LOT-17		NO	SYNDER, ROBERT
379159	C	2250	D	11	057	0 0	233218	2	110	258	Y	0	R	0					LOT-20		NO	TOWER
380246	C	2250	D	11	057	0 0	233218	2	111	262	Y	5	R	0					LOT-22		NO	BETTY, MR.
380247	C	2250	D	11	057	0 0	233218	2	108	218	Y	5	R	0					LOT-18		NO	FORD, MR.
380248	C	2250	D	11	057	0 0	233218	2	107	232	Y	5	R	0					LOT-10		NO	NORELSKI, MR.
380323	C	2250	D	11	057	0 0	233218	2	208	238	Y	15	R	0					LOT-20		NO	ROCHON, CONRAD
383519	C	2251	D	11	057	0 0	233218	2	130	232	N	6	R	0					000		NO	STEINBANG, GERALD
388162	C	2251	D	11	057	0 0	233218	2	112	232	Y	5	R	0					LOT 14		NO	GAMBRELL, HERMAN H.
388409	C	2251	D	11	057	0 0	233218	2	105	232	Y	5	R	0					LOT 17		NO	MACKENZIE, THERESA
393244	C	2250	D	11	057	0 0	233218	2	123	292	Y	5	R	0					LOT 22		NO	THARP, JOHN W
432318	I	1336	D	11	057	2 3	233218	3	90	125		0	C	15						0000	NO	NIXON, PRISCILLA
372431	C	1094	D	11	057	0 0	233218	4	100	235		0	R	17					000000		NO	HOBART, RENA
372517	C	1094	D	11	057	0 0	233218	4	101	243		0	R	0					LOT-25		NO	BLANCHARD

DATE 9/27/90 5:02:12 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

WELL CONSTRUCTION PERMITTING

RDE0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
372518	C	1094	D	11	057	0 0	233218	4	101	280		0	R	0					000000		NO	KAKIKA, MR.
372519	C	1094	D	11	057	0 0	233218	4	100	263		0	R	0					LOT-26		NO	BRICKER, MR.
372693	C	2250	D	11	057	0 0	233218	4	100	240		0	R	18					LOT-23		NO	TABER, EDWARD L.
372694	C	2250	D	11	057	0 0	233218	4	101	278		0	R	0					LOT-23		NO	BALABAS, LOUIS
372695	C	2250	D	11	057	0 0	233218	4	100	260		0	R	18					000000		NO	BAZAR, JERRY
373431	C	2250	D	11	057	0 0	233218	4	113	258	Y	7	R	20					000000		NO	LAMANO, RICHARD
373432	C	2250	D	11	057	0 0	233218	4	107	220	Y	6	R	15					000000		NO	TRIMMER, HOWARD
373433	C	2250	D	11	057	0 0	233218	4	106	212	Y	6	R	15					000000		NO	DOWNS, JACK
374138	C	2193	D	11	057	0 0	233218	4	74	356	N	0	C	14					000000		NO	SUN CITY GROVES
374163	C	2250	D	14	057	0 0	233218	4	105	236	Y	6	R	0					000000		NO	BOLLER, JOHN
374164	C	2250	D	14	057	0 0	233218	4	108	237	Y	7	R	26					000000		NO	VAUGH, CHARLES L.
378223	C	2088	D	11	057	0 0	233218	4	54	247	N	0	C	7					000000		NO	TODD JR., GEORGE
388970	E	1477	D	11	057	2 0	233218	4	240	240	N	0	C	0					000000		NO	TOOLE, R L
396802	C	2088	D	11	057	0 0	233218	4	84	194	N	0	C	22					000000		NO	ALTMAN, JAY C
406676	E	1477	D	11	057	2 3	233218	4	97	230	N	0	C	0					LOT A		NO	JONES, MARSHALL B
427847	I	2088	D	11	057	0 0	233218	4	63	250	Y	8	C	230						0000	NO	SIMMONS, MABEL
426494	I	2858	0	11	057	0 0	233218	2	2	12	Y	1	A	3					MW-1	0000	NO	PETROLEUM PRODUCTS SERVICE
426495	I	2858	0	11	057	0 0	233218	2	2	12	Y	1	A	3					MW-2	0000	NO	PETROLEUM PRODUCTS SERVICE
426496	I	2858	0	11	057	0 0	233218	2	2	12	Y	1	A	3					MW-3	0000	NO	PETROLEUM PRODUCTS SERVICE
426497	I	2858	D	11	057	0 0	233218	2	2	12	Y	1	A	3					MW-4	0000	NO	PETROLEUM PRODUCTS SERVICE
432837	I	2923	0	11	057	3 3	233218	2	15	15	Y	1	A	12					MW-1	0000	NO	SPEEDLING INC.
432838	I	2923	0	11	057	3 3	233218	2	15	15	Y	1	A	12					MW-2	0000	NO	SPEEDLING INC.
432839	I	2923	0	11	057	3 3	233218	2	15	15	Y	1	A	12					MW-3	0000	NO	SPEEDLING INC.
339065	H	1336	B	11	057	0 0	243218	3	107	220	Y	4	C	12					000000		NO	WIL MOB HMS
493374	I	1627	B	13	057	0 0	243218	5														BRATE, JAMES E
315498	H	0000	B	11	057	1 4	243218	6	94	293	N	0	C	14					000000		NO	NETHERS
344366	H	1094	D	11	057	0 0	243218	2	126	232		0	R	8					000000		NO	HART,R
381581	C	2251	D	11	057	0 0	243218	2	124	222	Y	6	R	0					LOT-12		NO	OLDFIELD
381582	C	2251	D	11	057	0 0	243218	2	129	242	Y	6	R	0					LOT-11		NO	SEEGAR
381583	C	2251	D	11	057	0 0	243218	2	129	225	Y	6	R	0					LOT-10		NO	MOOREHOUSE
381584	C	2251	D	11	057	0 0	243218	2	140	232	Y	6	R	0					LOT-15		NO	LUCAS
381894	C	2251	D	11	057	0 0	243218	2	122	222	Y	5	R	0					LOT-13		NO	DANIEL, CHARLENE
393875	C	2250	D	11	057	0 0	243218	2	110	222	Y	6	R	0					LOT 17		NO	SANTANA, C
395449	C	2250	D	11	057	0 0	243218	2														YOUNG, WILLIAM J
395450	C	2250	D	11	057	0 0	243218	2	107	252	Y	7	R	0					LOT 19		NO	ASKEW, ROYCE
395926	C	2251	D	11	057	0 0	243218	2	105	252	Y	3	R	0					LOT 14		NO	MCFARLAND, KENT MARSHALL
310646	E	0000	D	11	057	0 0	243218	3	53	185		0	C	5					000000		NO	W D WELLS
377156	E	1477	D	11	057	0 0	243218	3	76	212	N	0	C	0					LOT-16		NO	RAMEY, BOBBY
384360	C	1336	D	11	057	2 4	243218	3	59	210	N	0	C	0					000000		NO	RODRIGUEZ, JOSE G.

DATE 9/27/90 5:02:12 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT PAGE 5

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BNA BG RS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
386212	C	1336	D	11	057	2 4	243218	3	90	220	N	0	C	0					000000		NO	COMBS, HELEN F.
389662	C	1336	D	11	057	0 0	243218	3	92	216	N	0	C	22					000000		NO	BEATTIE, MARVIN
389663	C	1336	D	11	057	0 0	243218	3	74	230	N	0	C	22					000000		NO	BOYLER, EDWARD
421239	I	1336	D	11	057	3 1	243218	3	87	240		0	C	9						0000	NO	WALLACE, JOHNNY
378648	E	1477	D	11	057	0 0	243218	4	96	200	N	0	C	0					LOTB&C		NO	LARGE, FRANK
382852	C	2088	D	11	057	0 0	243218	4	67	250	N	0	C	18					000000		NO	THOMAS, PAUL
384713	E	1477	D	11	057	4 2	243218	4	96	220	N	0	C	0					LOT-14		NO	KLINGENSMITH, RLAPH L.
386968	C	2088	D	11	057	0 0	243218	4	94	245	N	0	C	13					000000		NO	LEE, MAX
388488	C	2088	D	11	057	0 0	243218	4	68	240	N	0	C	13					000000		NO	GOMEZ, FRANK
388752	C	2088	D	11	057	0 0	243218	4	78	205	N	0	C	10					000000		NO	SMITH, ED A
388753	C	2088	D	11	057	0 0	243218	4	83	200	N	0	C	5					000000		NO	SMITH, ED A
389270	C	2088	D	11	057	0 0	243218	4	74	200	N	0	C	16					000000		NO	SMITH, ED A
397110	C	2088	D	11	057	0 0	243218	4	83	203	N	0	C	0					000000		NO	CAVAZOS, PEDRO
401012	C	2088	D	11	057	0 0	243218	4	86	230	N	0	C	30					000000		NO	SMITH, ED
409590	E	1477	D	11	057	0 0	243218	4	66	220	N	0	C	0					L10&11		NO	MARSELL, GERALD A & CAROLYN R
409591	E	1477	D	11	057	0 0	243218	4	98	250	N	0	C	0					LOT 23		NO	MARSELL, GERALD A & CAROLYN R
409927	E	2267	D	11	057	1 4	243218	4	81	345	N	0	R	8					000000		NO	B. W. ELSBERRY TOMATO FARM
411224	E	1336	D	11	057	2 4	243218	4	75	230	N	0	C	0					LOT 10		NO	MAGIEMA, JOSEPH
418501	I	2088	D	11	057	0 0	243218	4	63	275	N	0	C	5						0000	NO	SMITH, ED
420882	I	1477	D	11	057	0 0	243218	4	110	200		0	C	0						0005	NO	MARSELL,JERRY
421240	I	1336	D	11	057	2 1	243218	4	73	220		0	C	9						0000	NO	COLPEAN, DON
423673	I	1477	D	11	057	0 0	243218	4	120	220		0	C	0						0012	NO	MARSELL, JERRY
429163	I	1477	D	11	057	1 1	243218	4	80	180		0	C	0						0000	NO	DEPT OF TRANSPORTATION
429991	I	1477	D	11	057	1 1	243218	4	80	120		0	C	0						0018	NO	DEPT OF TRANSPORATION
432250	I	2088	D	11	057	0 0	243218	4	120	260		0	C	0						0000	NO	DITIOLT, LEON
433410	I	1477	D	11	057	3 1	243218	4	107	246		0	C	0						0000	NO	CARDOSO, HENRY
460523	I	1477	D	11	057	0 0	243218	4	112	235		0	C	18						0000	NO	WEAVER, DAVID
496158	I	2088	D	11	057	0 0	243218	4	84	300		0	C	20						0000	NO	REGIS, ARLEN
490699	I	1627	D	14	057	0 0	243218	5	122	178	Y	39	R	15						0000	NO	WEAVER, DAVID
326391	E	1336	D	11	057	0 0	243218	8	189	413		0	C	17					000000		NO	H SCHAUBE
490810	I	1336	H	11	057	1 3	243218	3	100	210		0	C	20						0000	NO	RODRIGUEZ, JOSE G.
500894	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500895	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500896	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500897	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500898	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
500899	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE
502350	I	2825	0	11	057	0 0	243218	2	23	33		0	R	0						0000	NO	MOORINGS OF MANATEE
502353	I	2825	0	11	057	0 0	243218	2	2	12	Y	1	A	0						0000	NO	MOORINGS OF MANATEE

WELL CONSTRUCTION PERMITTING

RD80055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	B NA BG RS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
486178	I	1477	Y	11	057	2 4	243218	4	0	160	Y	12	R	0						0000	NO	WEAVER, DAVID
314709	E	0000	A	11	057	1 1	253218	4	73	351		0	C	10					000000		NO	J D STEPHEN
310992	E	0000	D	11	057	2 4	253218	3	60	230		0	C	1					000000		NO	S K MCPHERS
311087	E	0000	D	11	057	3 4	253218	3	77	230		0	C	0					000000		NO	LOUGHRIDGE
337727	E	1160	D	11	057	1 3	253218	3	52	190		0	C	22					000000		NO	CROCKETT,F
356620	C	2088	D	11	057	0 0	253218	3	63	240	N	0	C	12					000000		NO	FOLSOM, LINDA
339752	E	1056	D	11	057	0 0	253218	4	87	276		0	C	18					000000		NO	ALDERMAN,J
384663	C	2088	D	11	057	0 0	253218	4	91	240	N	0	C	12					L12-13		NO	MEEK, RICHARD
397425	C	2088	D	11	057	0 0	253218	4	82	226	N	0	C	30					000000		NO	STEINBERG, MAX
466270	I	2405	D	11	057	0 0	253218	4	99	225		0	C	0						0000	NO	W. W. CONST.
309438	E	0000	D	11	057	2 1	263218	3	68	242		0	C	6					000000		NO	J SEIFERT
325632	E	1336	D	11	057	0 0	263218	3	73	225		0	C	0					000000		NO	A DUDA & SO
413257	N	1376	A	11	057	0 0	273218	8	*** CANCELLED ***													WEISS, RUSSELL
325729	E	1336	D	11	057	0 0	273218	3	96	150		0	C	0					000000		NO	BEN ELLIS
502169	I	1336	D	11	057	2 2	273218	3														TODD, GEORGE
407705	E	1336	D	11	057	4 2	273218	4	1	150	N	0	C	0					000000		NO	TRABERT, FRED
374404	C	0001	T	14	057	0 0	283218	2	18	45	N	0	R	0					SM-39		NO	TAMPA ELECTRIC CO
407138	E	1376	D	11	057	0 0	303218	5	60	180	Y	20	R	20					000000		NO	LUCASS, ARTHUR S
448271	I	1376	D	21	081	0 0	313218	4	90	140		0	C	1						0000	NO	STIMSON, JOHN
469129	I	2088	D	11	057	0 0	313218	4	63	275		0	C	0						0000	NO	DUCHAINE, EDWARD
374341	C	0001	T	11	057	0 0	313218	2	24	30	N	0	R	0					TF1447		NO	TAMPA ELECTRIC CO
415367	I	1376	B	11	057	0 0	323218	4	80	165	Y	40	R	2						0000	NO	REEDER, J T
308919	E	0000	D	11	057	4 4	323218	3	94	205		0	R	30					000000		NO	D CONNELL
331726	E	1336	D	11	057	0 0	323218	3	72	125		0	C	9					000000		NO	M SACKS
375080	C	1376	D	11	057	0 0	323218	4	140	220	Y	8	R	80					000000		NO	GOSCHCOFF, VIRGIL
390445	C	2088	D	11	057	0 0	323218	4	63	230	N	0	C	14					000000		NO	SANTJER, J A
374405	C	0001	T	14	057	0 0	323218	2	6	13	N	0	R	0					000000		NO	TAMPA ELECTRIC CO
345026	H	1627		11	057	0 0	333218	4	82	320		0	T	5					000000		NO	DANT&RUSSEL
320560	E	1376	A	11	057	0 0	333218	12	245	980		0	C	45					000000		NO	COUNCIL FAR
348620	C	1699	B	11	057	0 0	333218	4	60	120	N	0	C	0					000000		NO	C A OAKES CONST CO
353531	C	1627	B	11	057	1 3	333218	4	80	502	Y	0	T	21					000000		NO	KANOUFF, RALPH
385505	C	1627	B	11	057	0 0	333218	5	93	448	Y	26	R	10		M	C		000000		NO	GIGGLIOTTI PIPELINE
320867	E	0000	D	11	057	1 3	333218	4	74	400		0	C	11					000000		NO	F GREEN
347369	C	1699	D	11	057	0 0	333218	4	60	187		0	C	0					000000		NO	OAKS, C. A. CONSTRUCTION
405356	C	1627	D	11	057	0 0	333218	5	74	235	Y	18	R	18		M	B		000000		NO	POWELL
469041	N	2987	O	11	057	0 0	333218	2	*** CANCELLED ***													FLORIDA BABCOCK LUMBER
469042	N	2987	O	11	057	0 0	333218	2	*** CANCELLED ***													FLORIDA BABCOCK LUMBER
469043	N	2987	O	11	057	0 0	333218	2	*** CANCELLED ***													FLORIDA BABCOCK LUMBER
469044	I	2987	O	11	057	0 0	333218	2														FLORIDA BABCOCK LUMBER

DATE 9/27/90 5:02:12 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:13 - 36 T:32 R:18 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BNA BGRS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
490890	I	2987	O	11	057	0 0	333218	2	2	16	Y	2	A	0						0000	NO	YOUNGS EQUIPMENT RENTAL, INC.
490891	I	2987	O	11	057	0 0	333218	2	2	16	Y	2	A	0						0000	NO	YOUNGS EQUIPMENT RENTAL, INC.
497235	I	2987	O	14	057	1 3	333218	2	2	16	Y	2	A	0						0000	NO	FLORIDA BABCOCK LUMBER
497236	I	2987	O	14	057	1 3	333218	2	2	16	Y	2	A	0						0000	NO	FLORIDA BABCOCK LUMBER
497237	I	2987	O	14	057	1 3	333218	2	2	16	Y	2	A	0						0000	NO	FLORIDA BABCOCK LUMBER
497238	I	2987	O	14	057	1 3	333218	2	2	16	Y	2	A	0						0000	NO	FLORIDA BABCOCK LUMBER
349090	N	1509	O	11	057	0 0	333218	12	*** CANCELLED ***													COUNCIL FARMS INC.
374406	C	0001	T	14	057	0 0	333218	2	26	31	N	0	R	0					000000		NO	TAMPA ELECTRIC CO
368580	C	1351	Y	11	057	0 0	333218	12	0	951	Y	87	R	0					000000		NO	TAMPA ELECTRIC CO.
312940	E	0000	A	11	057	0 0	343218	12	186	933		0	C	17					000000		NO	J GLISSON
318130	E	0000	A	11	057	0 0	343218	12	285	934		0	C	38					000000		NO	P COUNCIL
320441	E	1376	A	11	057	0 0	343218	12	138	891		0	C	35					000000		NO	COUNCIL FAR
326277	E	1376	A	11	057	0 0	343218	12	280	1025		0	C	35					000000		NO	COUNCIL FAR
494564	I	2870	D	11	057	0 0	343218	4	117	280		0	C	0						0000	NO	GABRIEL, LAWRENCE
349091	N	1509	O	11	057	0 0	343218	12	*** CANCELLED ***													WOLFORD FARMS INC.
368583	C	1351	Y	11	057	0 0	343218	12	710	930	Y	10	R	0					000000		NO	WOLFORD FARMS INC.
346757	H	1057	A	11	057	0 0	353218	10	230	580		0	C	10					000000		NO	COUNCIL FARMS INC.
430694	I	2382	D	15	053	0 0	353218	4	136	183		0	C	43						0021	NO	WERT, MARIAM
414248	I	1376	D	11	057	0 0	353218	5	105	160	Y	15	R	30						0000	NO	HAY, ELI
435837	I	2987	O	11	057	0 0	353218	2	15	16	N	0	A	0						0000	NO	ELSBERRY INC.
435838	I	2987	O	11	057	0 0	353218	2	15	16	N	0	A	0						0000	NO	ELSBERRY INC.
435839	I	2987	O	11	057	0 0	353218	2	15	16	N	0	A	0						0000	NO	ELSBERRY INC.
435840	I	2987	O	11	057	0 0	353218	2	15	16	N	0	A	0						0000	NO	ELSBERRY INC.
336053	E	1314	D	15	053	0 0	363218	4	63	97		0	C	50					000000		NO	SKIPPER R
374477	C	2148	E	14	057	2 3	363218	6	165	284	Y	40	R	0					SITE#1		NO	TAMPA ELECTRIC CO
374842	C	2148	O	11	057	2 3	363218	6	630	1060	Y	65	R	0					000000		NO	TAMPA ELECTRIC CO
374843	C	2148	O	11	057	2 3	363218	6	630	1060	Y	79	R	0					000000		NO	TAMPA ELECTRIC CO
374407	C	0001	T	11	057	0 0	363218	2	2	12	N	0	R	0					SM-13		NO	TAMPA ELECTRIC CO
374841	C	2148	T	11	057	2 3	363218	12	633	1061	Y	60	R	1					000000		NO	TAMPA ELECTRIC CO

DATE 9/27/90 5:44:37 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:12 - 13 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	STATIC WATER LEVEL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
394010	C	2382	A	15	053	0 0	123317	4	63	65	N	0	C	7					LOT 37		NO	DANDREA, MIRIAM
447372	I	1627	A	21	081	0 0	123317	5	47	220	Y	14	R	20						0000	NO	ZIROUX, ERNEST
447793	I	1627	A	21	081	0 0	133317	5														BROSIUS, RUSSELL

DATE 9/27/90 5:58:15 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT PAGE 1

RDB0055 WELL CONSTRUCTION PERMITTING

PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:23 - 27 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	B NA BG RS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
300522	C	1627	D	21	081	0 0	243317	3	62	180	N	0	C	0		Q	C	B	77-293		NO	HARLLEE, ELLA
700580	C	1627	D	21	081	0 0	243317	4														FAITH OF DELIVERENCE CHURCH
464289	I	1376	D	21	081	0 0	243317	5	42	160		0	C	3						0000	NO	GAY, RONALD L.
387964	C	2263	A	15	053	0 0	253317	4	63	110	N	0	C	35					000000		NO	MR. WHITACRE
445028	I	1627	A	21	081	0 0	253317	4	30	175		0	C	20						0000	NO	GLASS HARRY / WALLACE JAMES
446613	I	1013	A	21	081	0 0	253317	4	30	100		0	C	8						0000	NO	MARTIN JACK
448108	I	1051	A	21	081	0 0	253317	4	40	115		0	C	8						0000	NO	WOODSON, BILL
300133	C	1627	D	21	081	0 0	253317	4	68	230	N	0	T	6	A	Q	C		76-323		NO	UNDERWOOD, W. R.
445700	N	1376	D	21	081	0 0	253317	4	*** CANCELLED ***													BENJAMIN GEORGE
301507	E	1627	D	21	081	0 0	263317	3	37	100		0	C	10	A				000000		NO	TERRA C BAP
302843	C	1627	D	21	081	0 0	263317	3	65	125	N	0	C	7	A	M	C	B	M79-14		NO	DUNBAR, ROOSEVELT
700133	C	1627	D	21	081	0 0	263317	3														TERRA CEIA BAPTIST CHURCH
302907	C	1627	D	21	081	0 0	263317	4	37	122	N	0	T	2		R	C	B	79-129		NO	MANATEE DAY CARE CENTER
700375	C	1627	D	21	081	0 0	273317	3														CAMPBELL, DONALD
445766	I	1627	D	21	081	0 0	273317	4	262	328	Y	49	R	0						0000	NO	MULBERRY DAVE
448866	I	2831	D	21	081	0 0	273317	5	60	240	Y	18	R	0						0000	NO	HODGER, DEBBIE
448887	I	1627	D	21	091	0 0	273317	5	82	300	Y	21	R	1						0000	NO	MC CLANATHAN, MICHAEL
471217	I	1627	D	21	081	0 0	273317	5	160	300	Y	49	R	5						0000	NO	GRANT III, JAMES T.
447228	I	2251	Y	21	081	0 0	273317	6	50	100		0	C	0						0000	NO	MIXON, WILLIAM D.

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S: 1 - 1 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ S T R	DIA	CASE DEPH	WELL DEPH	GROUT	B NA BG RS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOP	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
445952	N	1627	A	21	081	0 0 013317	3	*** CANCELLED ***													SIPE MIKE
449243	I	2831	A	21	081	0 0 013317	5	60	300	Y	19	R	0						0000	NO	SIPE, MIKE
447592	N	1376	D	21	081	0 0 013317	5	*** CANCELLED ***													MANATEE CO. PORT AUTHORITY
300069	C	1627	L	21	081	0 0 013317	4	57	290	N	0	T	4			B		76-165		NO	SIPE, MIKE
447659	I	1627	L	21	081	0 0 013317	5	103	600	Y	18	R	9						0000	NO	LAVENDER, JACK
448405	I	1048	M	21	081	0 0 013317	16	100	100	Y	0	R	0						0000	NO	SIPE, MICHAEL
446462	N	2372	0	21	081	0 0 013317	2	*** CANCELLED ***													MANATEE PORT AUTHORITY
446463	N	2372	0	21	081	0 0 013317	2	*** CANCELLED ***													MANATEE PORT AUTHORITY
446464	N	2372	0	21	081	0 0 013317	2	*** CANCELLED ***													MANATEE PORT AUTHORITY
446495	N	2372	0	21	081	0 0 013317	2	*** CANCELLED ***													MANATEE PORT AUTHORITY
446496	N	2372	0	21	081	0 0 013317	2	*** CANCELLED ***													MANATEE PORT AUTHORITY
446497	N	2372	0	21	081	0 0 013317	2	*** CANCELLED ***													PORT MANATEE AUTHORITY
447949	N	2338	0	21	081	0 0 013317	2	*** CANCELLED ***													FLA.DEPT.OF ENVIRONMENT REGUL.
447980	N	2338	0	21	081	0 0 013317	2	*** CANCELLED ***													FLA. DEPT.OF ENVIRONMENTAL REG.
447981	N	2338	0	21	081	0 0 013317	2	*** CANCELLED ***													FLA. DEPT. OF ENVIRONMENTAL REG
447982	N	2338	0	21	081	0 0 013317	2	*** CANCELLED ***													FLA. DEPT. OF ENVIRONMENTAL REG
447983	N	2338	0	21	081	0 0 013317	2	*** CANCELLED ***													FLA. DEPT. OF ENVIRONMENTAL REG
449247	I	1974	0	21	081	0 0 013317	2	8	8	Y	1	A	0						0000	NO	TECO
464003	I	2858	0	21	081	0 0 013317	2	13	13	Y	1	A	0						0000	NO	COUNTY OF MANATEE
464005	I	2858	0	21	081	0 0 013317	2	13	13	Y	1	A	0						0000	NO	COUNTY OF MANATEE
464007	I	2858	0	21	081	0 0 013317	2	13	13	Y	1	A	0						0000	NO	COUNTY OF MANATEE
464008	I	2858	0	21	081	0 0 013317	2	13	13	Y	1	A	0						0000	NO	COUNTY OF MANATEE
447560	I	2372	0	21	081	0 0 013317	8	22	22		0	C	5						0000	NO	PORT MANATEE
447561	I	2372	0	21	081	0 0 013317	8	22	22	Y	2	R	8						0000	NO	PORT MANATEE
447984	N	2338	T	21	081	0 0 013317	1	*** CANCELLED ***													FLA. DEPT. OF ENVIRONMENTAL REG
374408	C	0001	T	21	081	0 0 013317	2	4	8	N	0	R	0					SM-05		NO	TAMPA ELECTRIC CO

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:34 - 35 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	NBR BAGS	METHOD	SWL	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
445011	I	1627	A	21	081	0 0	343317	4	40	100		0	C	10						0000	NO	BRENTSON EVAN R.
700828	C	1013	A	21	081	0 0	343317	4														KEZAR, FATHER
701038	C	1013	A	21	081	0 0	343317	4														COYNER, DON
446014	I	1627	A	21	081	0 0	343317	5	62	144		0	R	6						0000	NO	KOOLS KEVIN
446530	I	1627	A	21	081	0 0	343317	5	93	140	Y	25	R	1						0000	NO	TINSLEY T.L.
446554	I	1627	A	21	081	0 0	343317	5	47	340	Y	13	R	0						0000	NO	JARVIS CONSTRUCTION WELL#2
446555	I	1627	A	21	081	0 0	343317	5	40	440	Y	12	R	0						0000	NO	JARVIS CONSTRUCTION WELL#1
463889	I	1627	A	21	115	0 0	343317	5														WHITEHEAD, BRENT
470311	I	1627	A	21	081	0 0	343317	5														WHITEHEAD, BRENT
301458	E	1627	D	21	081	0 0	343317	3	35	145		0	C	0		S	C		000000		NO	WEVER,B
447054	N	1051	D	21	081	0 0	343317	3	*** CANCELLED ***													JOHNSON, BOOTS
700083	C	1627	D	21	081	0 0	343317	3														WEVER, BYRON
300550	C	1627	D	21	081	0 0	343317	4	48	72	N	0	C	10			C	B	77-337		NO	YEAGER, MIKE
301407	E	1627	D	21	081	0 0	343317	4	60	122		0	T	1	A	Q	C		000000		NO	KITCHELL,L
301500	E	1627	D	21	081	0 0	343317	4	40	115		0	C	0					000000		NO	HINSON,H N
445474	I	1627	D	21	081	0 0	343317	4	48	260		0	C	0						0000	NO	PERVIS JIM
445684	I	1627	D	21	081	0 0	343317	4	52	100	Y	5	R	0						0000	NO	COUCH DEL
445797	I	1627	D	21	081	0 0	343317	4	53	101		0	R	0						0000	NO	WILSON PAUL
463996	I	1376	D	21	081	0 0	343317	4	30	80	Y	14	R	6						0000	NO	MADDOX, MIKE
700033	C	1627	D	21	081	0 0	343317	4														KITCHELL, LARRY
700126	C	1627	D	21	081	0 0	343317	4														HINSON, H. N.
700502	C	1627	D	21	081	0 0	343317	4														MARLOW, MARK
700809	C	1627	D	21	081	0 0	343317	4														LINDSEY, PEGGY
447394	I	1627	D	21	081	0 0	343317	5	45	100	Y	13	R	0						0000	NO	ENGLERT, GEORGE
300036	C	1627	A	21	081	0 0	353317	3	65	150	N	0	C	0	A	R	B		76-089		NO	DAVIS, JESSE
300518	C	1627	A	21	081	0 0	353317	3	66	117	N	0	C	2	A	Q	C	B	77-285		NO	DETAR, JEAN B.
300534	C	1627	A	21	081	0 0	353317	3	41	142	N	0	C	1			C	B	77-308		NO	STEINER, OTTO
300578	C	1627	A	21	081	0 0	353317	3	56	113	N	0	C	2	A	Q	C		77-379		NO	ERLANDSON, CARL
300584	C	1627	A	21	081	0 0	353317	3	43	70	N	0	C	1	A	R	C		77-390		NO	LEE, CAPTAIN C. J.
300601	C	1627	A	21	061	0 0	353317	3	54	116	N	0	C	3	A	Q	C	B	77-419		NO	SHOVER, JOHN
301463	E	1627	A	21	081	0 0	353317	3	90	120		0	C	2	A	P	C		000000		NO	TEJKL,H
301474	E	1627	A	21	081	0 0	353317	3	31	140		0	C	2	A	R	C		000000		NO	CAMPBELL,A
301515	E	1627	A	21	081	0 0	353317	3	50	100		0	C	6	A	Q	C		000000		NO	MERHOFF,D
301521	E	1013	A	21	081	0 0	353317	3	50	107		0	C	6	A				000000		NO	D'AMELIO,G
301533	C	1627	A	21	081	0 0	353317	3	52	108		0	C	6	B	O	C		78-208		NO	MCALLISTER, LLOYD
301664	C	1627	A	21	081	0 0	353317	3	54	150	N	0	C	2	C	O	B		78-484		NO	DALGAARD, CARLTON
301668	C	1627	A	21	081	0 0	353317	3	66	135	N	0	C	2					78-490		NO	SANSKY, ANN
302888	C	1627	A	21	081	0 0	353317	3	69	120	N	0	T	1		Q	C	B	M79-84		NO	UNSEL, ARVEL
302894	C	1627	A	21	081	0 0	353317	3	70	130	N	0	T	2		Q	C	B	M79-97		NO	FERGUSON, MARVIN H.

DATE 9/27/9? 6:10:55 SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT PAGE 2

WELL CONSTRUCTION PERMITTING

RDB0055 PERMIT SUMMARY FROM: 00/00/00 TO 99/99/99

BY: COUNTY: BASIN: S:34 - 35 T:33 R:17 DEPTH: 0 TO 9999 DIAMETER: 0 TO 99 METHOD: USE: CASE DEPTH:

PERMIT	STATUS	DRILL LICN NUMBR	USE	BASIN	COUNTY	LOCATION QQQ	S T R	DIA	CASE DEPH	WELL DEPH	GROUT	BNA BGRS	METHOD	SWL TAE ATV TEE IRL C	SPCAP	CHLOR	IRON	SULF	USER-ID	LOT	LITH	OWNER NAME
700089	C	1627	A	21	081	0 0	353317	3														TEJKL, HAROLD
700100	C	1627	A	21	081	0 0	353317	3														CAMPBELL, A. P.
700141	C	1627	A	21	081	0 0	353317	3														MERHOFF, DON
700147	C	1627	A	21	081	0 0	353317	3														D'AMELIO, GUY
700421	C	1627	A	21	081	0 0	353317	3														KING, FLORENCE
700446	C	1627	A	21	081	0 0	353317	3														MAY, STANLEY F.
700465	C	1627	A	21	081	0 0	353317	3														LOCKARD, THURMAN
700920	C	1627	A	21	081	0 0	353317	3														SPICER, WILLIS
701033	C	1627	A	21	081	0 0	353317	3														ELZERMAN, DICK
464313	I	1360	A	21	081	0 0	353317	4														KRANER, MR.
700850	C	1013	A	21	061	0 0	353317	4														HANNAH, ED
700985	C	1627	A	21	081	0 0	353317	4														SEIZ, FRANK
701003	C	1627	A	21	081	0 0	353317	4														ELZERMAN, DICK
446726	I	1627	A	21	081	0 0	353317	5	54	100	Y	15	R	0						0000	NO	NARQUINE C.
449031	I	1627	A	21	081	0 0	353317	5	82	170	Y	22	R	2						0000	NO	RIESEL, ERNEST
470284	I	1627	A	21	081	0 0	353317	5														HARMON, ROBERT
300598	C	1627	D	21	081	0 0	353317	3	46	70	N	0	C	0		P	C		77-411		NO	WHITNEY, HARRY
300602	C	1627	D	21	081	0 0	353317	3	50	116	N	0	C	0		Q	C		77-420		NO	SHOVER, JOHN
448331	I	1627	D	21	081	0 0	353317	5	58	200	Y	15	R	9						0000	NO	CAMPBELL, WILLARD
449327	I	1627	D	21	081	0 0	353317	5	62	220	Y	19	R	18						0000	NO	FERENCZ, JIM

REFERENCE # 26

GROUND WATER GUIDANCE CONCENTRATIONS

FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
Division of Water Facilities

Bureau of Ground Water Protection
Compiled by: Randy Merchant
February 1989

INTRODUCTION

A table of ground water guidance concentrations was distributed to all DER District Offices October 2, 1986 to provide guidance to District personnel in reviewing effluent and ground water quality data for Minimum Criteria requirements (Rule 17-3.402, F.A.C.). This booklet, Ground Water Guidance Concentrations is an update of that 1986 table, incorporating toxicological data that has become available since then. This updated version has the same purpose and format of the original table and should be used in its place.

Three significant sources of toxicological information have become available since the table was originally compiled in 1986: 50 pesticide Health Advisories from the EPA Office of Drinking Water, 45 Recommended Protective Concentrations (RPCs) proposed by the Center for Biomedical and Toxicological Research (CBTR) at Florida State University, and 26 new EPA proposed Maximum Contaminant Levels (MCLs). These three sources account for the majority of the new entries and updates to this booklet. The Appendix to this booklet elaborates on the procedures and priorities used to compile these sources. The resulting Guidance Concentrations were compared to other state guidelines and standards and were reviewed by Florida and EPA toxicologists.

The concentrations in this booklet are not standards and without adoption by the Environmental Regulation Commission can not be used as standards. These guidelines should be used to screen analytical chemical results so that concentrations above the Guidance Concentration will be given closer scrutiny. In permitting or enforcement cases an expert may be needed to verify the carcinogenicity or other human health hazards of contaminants above the Guidance Concentration. This booklet has been compiled from published research on human health risks from the direct consumption of ground water. These concentrations, however, may be modified in the future as new research becomes available and feedback is received.

The concentrations in this booklet are designed to apply to ground water only and should not be used for surface water applications. In cases where a significant ground water discharge to surface water is anticipated, a lower Guidance Concentration may be necessary due to the additional human exposure via consumption of contaminated fish and other aquatic organisms. A lower ground water Guidance Concentration may also be necessary to protect fish and aquatic organisms from direct toxic effects of a ground water to surface water discharge.

These ground water Guidance Concentrations are based on health effects and are not designed to be used as ground water clean-up goals, which may consider additional factors such as feasibility, existing technology, and costs. In some cases it may not feasible to remediate ground water to low level, health based concentrations.

The column "Detection Limit" in the original table has been modified to read "Practical Quantitation Level" in this booklet. This change more closely reflects the original intent to provide an estimate of the lowest concentration routinely quantifiable by most analytical laboratories. The concentrations under "Detection Limit" in the original table were in some cases overly optimistic and were not obtainable on a routine basis. The Appendix to this booklet details the derivation of the Practical Quantitation Levels.

The Bureau of Ground Water Protection, UIC Criteria & Standards Section is prepared to assist in the interpretation and application of this information. Questions regarding this Ground Water Guidance Concentrations booklet should be directed to either Jim McNeal or Randy Merchant (904 488-3601, SC 278-3601).

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
GROUND WATER GUIDANCE CONCENTRATIONS*
FEBRUARY 1989

CAS #	Parameter	ppb Guidance* Concentration (ug/L)	Practical Quantitation Level (ug/L)	Basis/Comment
83-32-9	Acenaphthene	20	10	Organoleptic (AWQCD)
208-96-8	Acenaphthylene	10	10	PQL
67-64-1	Acetone	700	5-10 A	IRIS
5094-66-6	Acifluorfen (Blazer)	10	5-10 A	PQL / 1ug/L = 10^{-6} cancer risk (H.A.)
107-02-8	Acrolein (Propenal)	110	5	EPA PPCL
79-06-1	Acrylamide (2-Propeneamide)	1	1	PQL / 0.01ug/L=10^{-6} cancer risk (CAG)
107-13-1	Acrylonitrile	2.5	2.5	PQL / 0.063ug/L=10^{-6} cancer risk (AWQCD)
15972-60-8	Alachlor	1.5	1	Lifetime Health Adv.
116-06-3	Aldicarb (Temik)	10	5	Lifetime Health Adv.
	Aldicarb sulfoxide	10	5	Lifetime Health Adv.
1646-88-4	Aldicarb sulfone	40 **	5	Lifetime Health Adv.
309-00-2	Aldrin	0.05	0.05	PQL / RPC= 0.013 ug/L
	Alpha, gross ****	15 pCi/L		Primary D.W. Standard
834-12-8	Ametryn	60	5-10 A	Lifetime Health Adv.
7773-06-0	Ammonium sulfamate	2,000	5-10 X	Lifetime Health Adv.
120-12-7	Anthracene	10	10	PQL
7440-36-0	Antimony	29	20	EPA PPCL (ADI)
	Arsenic ****	50	5	Primary D.W. Standard
1332-21-4	Asbestos ***	7 million fibers/L	0.1 million fibers/L	Proposed EPA MCL
1912-24-9	Atrazine	3	0.25	Lifetime Health Adv.
	Barium ****	1,000	500	Primary D.W. Standard
114-26-1	Baygon (Propoxur)	10	5-10 A	PQL / 3ug/L=Lifetime Health Advisory
25057-89-0	Bentazon	20	5-10 A	Lifetime Health Adv.
71-43-2	Benzene ****	1	1	Primary D.W. Standard
	Benzenehexachloride (See Hexachlorocyclohexane)			
92-87-5	Benzidine	10	10	PQL / 0.00015ug/L=10^{-6} cancer risk (AWQCD)
56-55-3	Benzo(a)anthracene	10	10	PQL
205-99-2	Benzo(b)fluoranthene	10	10	PQL
207-08-9	Benzo(k)fluoranthene	10	10	PQL

*The concentrations in this table are only to be used as a screening guideline for ground water contamination. These concentrations are not standards and without further justification can not be used as standards.

CAS #	Parameter	Guidance* Concentration (ug/L)	Practical Quantitation Level (ug/L)	Basis/Comment
191-24-2	Benzo(g,h,i)perylene	10	10	PQL
50-32-8	Benzo(a)pyrene	10	10	PQL / 0.003ug/L=10^{-6} cancer risk (AWQCD)
7440-41-7	Beryllium	5	5	PQL / 0.004ug/L=10^{-6} cancer risk (AWQCD)
	BHC (See Hexachloro-cyclohexane)			
92-52-4	Biphenyl	10	5-10 A	PQL / 0.5ug/L = organoleptic (RPC)
314-40-9	Bromacil	90	10	Lifetime Health Adv.
75-27-4	Bromodichloromethane (See Trihalomethane)			
75-25-2	Bromoform (See Trihalomethane)			
74-83-9	Bromomethane (Methyl bromide)	20	10	RPC
101-55-3	4-Bromophenyl phenyl ether	10	10	PQL
78-93-3	2-Butanone (See Methyl ethyl ketone)			
123-86-4	n-Butyl acetate	43	5-10 X	Organoleptic (RPC)
2008-41-5	Butylate	700	5-10 A	Lifetime Health Adv.
85-68-7	Butyl benzyl phthalate	1,400	10	IRIS
85-70-1	Butyl phthalyl butyl glycolate	120,000	5-10 A	Water solubility limit (AWQCD ADI=350,000ug/L)
	Cadmium ****	10	10	Primary D.W. Standard
63-25-2	Carbaryl (Sevin)	700	5	Lifetime Health Adv.
1563-66-2	Carbofuran	36	5	Lifetime Health Adv.
108-95-2	Carbolic acid (See Phenol)			
56-23-5	Carbon tetrachloride **** (Tetrachloromethane)	3	1	Primary D.W. Standard
5234-68-4	Carboxin	700	5-10 A	Lifetime Health Adv.
133-90-4	Chloramben	100	5-10 A	Lifetime Health Adv.
57-74-9	Chlordane	0.1 1.0 ppb [illegible]	0.1	PQL / 0.027 ug/L=10^{-6} cancer risk (H.A.)
	Chloride ****	250,000	1000	Secondary D.W. Std.
108-90-7	Chlorobenzene	10	1	Organoleptic (H.A.)
124-48-1	Chlorodibromomethane (See Trihalomethane)			

*The concentrations in this table are only to be used as a screening guideline for ground water contamination. These concentrations are not standards and without further justification can not be used as standards.

CAS #	Parameter	Guidance* Concentration (ug/L)	Practical Quantitation Level (ug/L)	Basis/Comment
78-59-1	Isoacetophorone (See Isophorone)			
78-59-1	Isophorone	1,050 #	10	AWQCD (ADI)
98-82-8	Isopropyl benzene (Cumene)	10	5-10 A	PQL / 0.8ug/L = organoleptic (RPC)
	Lead ****	50	50	Primary D.W. Standard
58-89-9	Lindane ****	4	0.05	Primary D.W. Standard
330-55-2	Linuron	22	0.05	RPC
123-33-1	Maleic hydrazide	4,000	5-10X	Lifetime Health Adv.
12327-38-2	Maneb	75	75	PQL / 14 ug/L = RPC
	Manganese ****	50	25	Secondary D.W. Std.
94-74-6	MCPA (4-Chloro-2-methylphenoxy acetic acid)	1,000	1,000 A	PQL / 4 ug/L= Lifetime Health Adv.
	Mercury ****	2	0.2	Primary D.W. Standard
10265-92-6	Methamidophos	18	5-10 X	RPC
16752-77-5	Methomyl	200	50	Lifetime Health Adv.
72-43-5	Methoxychlor ****	100	0.5	Primary D.W. Standard
74-83-9	Methyl bromide (See Bromomethane)			
74-87-3	Methyl chloride (See Chloromethane)			
534-52-1	2-Methyl-4,6-dinitrophenol (See 4,6-Dinitro-o-cresol)			
75-09-2	Methylene chloride (Dichloromethane)	5	1	10^{-6} cancer risk (Health Advisory)
78-93-3	Methyl ethyl ketone (MEK, 2-Butanone)	170 #	10	Lifetime Health Adv.
60-34-4	Methyl hydrazine	10	5-10 A	PQL / 0.03ug/L=10^{-6} cancer risk (EPA PPCL)
108-10-1	Methyl isobutyl ketone (4-Methyl-2-pentanone)	350 #	5	IRIS
298-00-0	Methyl parathion	10	5-10 A	PQL / 2ug/L= Lifetime Health Adv.
51218-45-2	Metolachlor	100	5-10 A	Lifetime Health Adv.
21087-64-9	Metribuzin	200	2	Lifetime Health Adv.
2385-85-5	Mirex	3.5	0.1	RPC
91-20-3	Napthalene	10	10	PQL ' 6.8ug/L = organoleptic (RPC)
7440-02-0	Nickel	150	50	Lifetime Health Adv.
	Nitrate (as N) ****	10,000	5	Primary D.W. Standard
	Nitrite (as N)	1,000	100	Health Advisory

*The concentrations in this table are only to be used as a screening guideline for ground water contamination. These concentrations are not standards and without further justification can not be used as standards.

GROUND WATER
GUIDANCE CONCENTRATIONS

FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
Division of Water Facilities

Bureau of Ground Water Protection
Compiled by: Randy Merchant

February 1989

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
GROUND WATER GUIDANCE CONCENTRATIONS*
FEBRUARY 1989

CAS #	Parameter	ppb Guidance* Concentration (ug/L)	Practical Quantitation Level (ug/L)	Basis/Comment
83-32-9	Acenaphthene	20	10	Organoleptic (AWQCD)
208-96-8	Acenaphthylene	10	10	PQL
67-64-1	Acetone	700	5-10 A	IRIS
5094-66-6	Acifluorfen (Blazer)	10	5-10 A	PQL / 1ug/L = 10^{-6} cancer risk (H.A.)
107-02-8	Acrolein (Propenal)	110	5	EPA PPCL
79-06-1	Acrylamide (2-Propeneamide)	1	1	PQL / 0.01ug/L=10^{-6} cancer risk (CAG)
107-13-1	Acrylonitrile	2.5	2.5	PQL / 0.063ug/L=10^{-6} cancer risk (AWQCD)
15972-60-8	Alachlor	1.5	1	Lifetime Health Adv.
116-06-3	Aldicarb (Temik)	10	5	Lifetime Health Adv.
	Aldicarb sulfoxide	10	5	Lifetime Health Adv.
1646-88-4	Aldicarb sulfone	40 **	5	Lifetime Health Adv.
309-00-2	Aldrin	0.05	0.05	PQL / RPC= 0.013 ug/L
	Alpha, gross ****	15 pCi/L		Primary D.W. Standard
834-12-8	Ametryn	60	5-10 A	Lifetime Health Adv.
7773-06-0	Ammonium sulfamate	2,000	5-10 X	Lifetime Health Adv.
120-12-7	Anthracene	10	10	PQL
7440-36-0	Antimony	29	20	EPA PPCL (ADI)
	Arsenic ****	50	5	Primary D.W. Standard
1332-21-4	Asbestos ***	7 million fibers/L	0.1 million fibers/L	Proposed EPA MCL
1912-24-9	Atrazine	3	0.25	Lifetime Health Adv.
	Barium ****	1,000	500	Primary D.W. Standard
114-26-1	Baygon (Propoxur)	10	5-10 A	PQL / 3ug/L=Lifetime Health Advisory
25057-89-0	Bentazon	20	5-10 A	Lifetime Health Adv.
71-43-2	Benzene ****	1	1	Primary D.W. Standard
	Benzenehexachloride (See Hexachloro-cyclohexane)			
92-87-5	Benzidine	10	10	PQL / 0.00015ug/L=10^{-6} cancer risk (AWQCD)
56-55-3	Benzo(a)anthracene	10	10	PQL
205-99-2	Benzo(b)fluoranthene	10	10	PQL
207-08-9	Benzo(k)fluoranthene	10	10	PQL

*The concentrations in this table are only to be used as a screening guideline for ground water contamination. These concentrations are not standards and without further justification can not be used as standards.

CAS #	Parameter	Guidance* Concentration (ug/L)	Practical Quantitation Level (ug/L)	Basis/Comment
107-02-8	Propenal (See Acrolein)			
76-06-1	2-Propeneamide (see Acrylamide)			
122-42-9	Propham	100	5-10 A	Lifetime Health Adv.
129-00-0	Pyrene	10	10	PQL
	Radium-226+228 ****	5 pCi/L		Primary D.W. Standard
	Selenium ****	10	5	Primary D.W. Standard
	Silver ****	50	50	Primary D.W. Standard
93-72-1	Silvex (2,4,5-TP) ****	10	1	Primary D.W. Standard
122-34-9	Simazine	10	5-10 A	PQL / 4ug/L=Lifetime H.A.
	Sodium ****	160,000	500	Primary D.W. Standard
100-42-5	Styrene (Vinyl benzene)	1	1	PQL / 0.01 ug/L=10^{-6} cancer risk (H.A.)
	Sulfate ****	250,000	500	Secondary D.W. Std.
93-76-5	2,4,5-T (See 2,4,5-Trichlorophenoxy-acetic acid)			
	TDS (Total **** Dissolved Solids)	500,000		Secondary D.W. Std.
34014-18-1	Tebuthiuron	500	5-10 A	Lifetime Health Adv.
116-06-3	Temik (See Aldicarb)			
5902-51-2	Terbacil	90	5-10 A	Lifetime Health Adv.
13071-79-9	Terbufos	10	5-10 A	PQL / 0.9 ug/L= Lifetime Health Adv.
95-94-3	1,2,4,5-Tetrachloro-benzene	35	10	EPA PPCL (ADI)
1746-01-6	2,3,7,8-Tetrachloro-dibenzo-p-dioxin (TCDD, Dioxin)	0.01	0.01	PQL/ 2.2 X 10^{-7}ug/L= 10^{-6} cancer risk (Health Advisory)
79-34-5	1,1,2,2-Tetra-chloroethane	1	1	PQL / 0.8 ug/L = RPC
127-18-4	Tetrachloroethylene **** (Perchloroethylene)	3	1	Primary D.W. Standard
56-23-5	Tetrachloromethane **** (Carbon-tetrachloride)	3	1	Primary D.W. Standard
7440-28-0	Thallium	10	10	PQL / 3.7ug/L=EPA PPCL
108-88-3	Toluene	24	1	Organoleptic (RPC)
636-21-5	o-Toluidine hydrochloride	10	5-10 X	PQL / 0.146ug/L=10^{-6} cancer risk (EPA PPCL)
	Total Dissolved **** Solids (TDS)	500,000		Secondary D.W. Std.
8001-35-2	Toxaphene ****	5	1	Primary D.W. Standard

*The concentrations in this table are only to be used as a screening guideline for ground water contamination. These concentrations are not standards and without further justification can not be used as standards.

REFERENCE # 27

DEVELOPMENT OF REGIONAL IMPACT

APPLICATION FOR DEVELOPMENT APPROVAL

FOR
IMC FERTILIZER, INC.
NEW WALES GYPSUM STACK EXPANSION
POLK COUNTY, FLORIDA

JULY, 1988

stack can be used to project these parameters for the proposed stack expansion.

In this regard, samples of phosphogypsum were collected and analyzed for radium-226 to help characterize the potential for its release to the environment from the phosphogypsum stack. Radon flux measurements were taken to measure radon emissions from the stack. Ambient concentrations of radon in air, working levels, and radium-226 in suspended particulate matter were measured to estimate concentrations of radioactivity in the environment surrounding the New Wales facility. In addition, atmospheric dispersion modeling techniques were used to estimate ambient concentrations of radon expressed in working levels.

The results of the assessment indicate that existing levels of radioactivity in air in the vicinity surrounding the New Wales facility are well below radiation protection criteria. In addition, projections of future levels of environmental radioactivity indicate that increases which may occur as a result of the phosphogypsum stack expansion will be minimal. The following sections describe the procedures used to conduct the assessment and the results obtained.

ENVIRONMENTAL RADIATION CRITERIA

No specific standards have been adopted which relate to airborne emissions of radium-226 and radon-222 from phosphogypsum stacks. That is, standards for radon or radium in ambient air or radium in soils have not been promulgated. However, some criteria do exist which can be used for comparative purposes.

The State of Florida maximum permissible concentration (MPC) for radium-226 in air is 2×10^{-12} microcuries per milliliter or two picocuries per cubic meter (Florida Administrative Code, Chapter 10 D-91). This MPC is not an ambient air quality standard but refers to releases of radioactive materials by holders of Radioactive Materials Licenses. While no specific criteria exist for radium deposition, the National Council on Radiation Protection and Measurements has recommended a guide of 40 picocuries of radium-226 per gram of soil as a concentration to be evaluated for agricultural land use (NCRP 1984).

With respect to radon-222 progeny, the State of Florida has adopted an indoor standard of 0.02 working levels (WL) for new construction (Florida Administrative Code, Chapter 10 D-91). For the purposes of comparing radon concentrations in air to this radon progeny standard, a concentration of 4 picocuries of radon in one liter of air is considered to be equivalent to 0.02 WL.

U . S .   E P A   R E G I O N   I V

SDMS

Unscannable Material Target Sheet

DocID: 10079026 Site ID: FID430551S

Site Name: Hew Site

Nature of Material:

Map:	✓	Computer Disks:	
Photos:		CD-ROM:	
Blueprints:		Oversized Report:	
Slides:		Log Book:	

Other (describe): ~~(2) Structural surface of the base of the upper~~

(5) Amount of material: Floridian aquifer, Thickness of upper Floridian aquifer, Structural surface of top of Floridian aquifer system, Structural surface and lithology of rocks of Paleocene age

Please contact the appropriate Records Center to view the material.

NUS
CORPORATION

1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404-938-7710

C-586-9-0-206

September 25, 1990

Mr. William Bokey
Environmental Protection Agency
College Station Road
Athens, Georgia 30613

Subject: Screening Site Inspection, Phase II
Study Plan
AMAX Phosphate
Palmetto, Manatee County, Florida
EPA ID No. FLD043055151
TDD No. F4-9009-01

Dear Mr. Hanke:

Enclosed please find two copies of the Study Plan, Revision 0, for the Screening Site Inspection to be conducted at AMAX Phosphate, Palmetto, Manatee County, Florida. Field work is scheduled for the week of October 15, 1990.

If you have any comments,please do not hesitate to contact me.

Very truly yours,

Maureen Gordon

Maureen Gordon, Ph.D.
Project Manager

Approved:

MG/jec

Enclosures (2)

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SEPT 2 , 90

SEP 28 1990

R-586-9-0-16

STUDY PLAN
SCREENING SITE INSPECTION, PHASE II
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA
EPA ID #: FLD043055151

Prepared Under
TDD No. F4-9009-01
CONTRACT NO. 68-01-7346

Revision 0

FOR THE

WASTE MANAGEMENT DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 25, 1990

NUS CORPORATION
SUPERFUND DIVISION

Prepared By	Reviewed By	Approved By
Maureen Gordon	Bob Donoghue	Phil Blackwell
Maureen M. Gordon, Ph.D. Project Manager	Roger Franklin Assistant Regional Project Manager	Phil Blackwell Regional Project Manager

NOTICE

The information in this document has been funded wholly by the United States Environmental Protection Agency (EPA) under Contract Number 68-01-7346 and is considered proprietary to the EPA.

This information is not to be released to third parties without the expressed or written consent of the EPA.

TABLE OF CONTENTS

FIGURES

TABLES

STUDY PLAN
SCREENING SITE INSPECTION, PHASE II
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA
EPA ID #FLD043055151
TDD NO. F4-9009-01

1.0 INTRODUCTION

The NUS Corporation Region 4 Field Investigation Team (FIT) has been tasked by the U.S. Environmental Protection Agency (EPA), Waste Management Division to conduct a Screening Site Inspection (SSI) at the AMAX Phosphate facility in Manatee County, Florida. The inspection will be performed under the authority of the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Tasks will be performed to satisfy the requirements stated in Phase II of Technical Directive Document (TDD) number F4-9009-01.

1.1 Objectives

The objectives of this Phase II inspection will be to determine the nature of contaminants present at the site and to determine if a release of these substances has occurred or may occur. Further, this inspection will seek to determine the possible pathways by which contamination could migrate from the site and the populations and environments it would potentially affect. Through these objectives, a recommendation will be made regarding future activities at the site.

Specific elements are:

- Obtain information to prepare a site-specific preliminary HRS
- Provide EPA the necessary information to make decisions on any other actions warranted at the site.

1.2 Scope of Work

The scope of this investigation will include the following activities:

- Obtain and review background materials relevant to HRS scoring of site
- Obtain aerial photographs and maps of site, if possible
- Obtain information on local water systems
- Evaluate target populations associated with the groundwater, surface water, air and onsite exposure pathways
- Conduct a survey of private wells
- Determine location and distance to nearest potable well
- Develop a site sketch
- Collect environmental samples

1.3 Schedule

Week of October 15, 1990

1.4 Personnel

Project Manager - Maureen Gordon
Other personnel as required

1.5 Permits and Authorization Requirements

EPA is responsible for obtaining access to the site and permission to take photographs of site. In addition, EPA is responsible for all permits which may be required to accomplish this task.

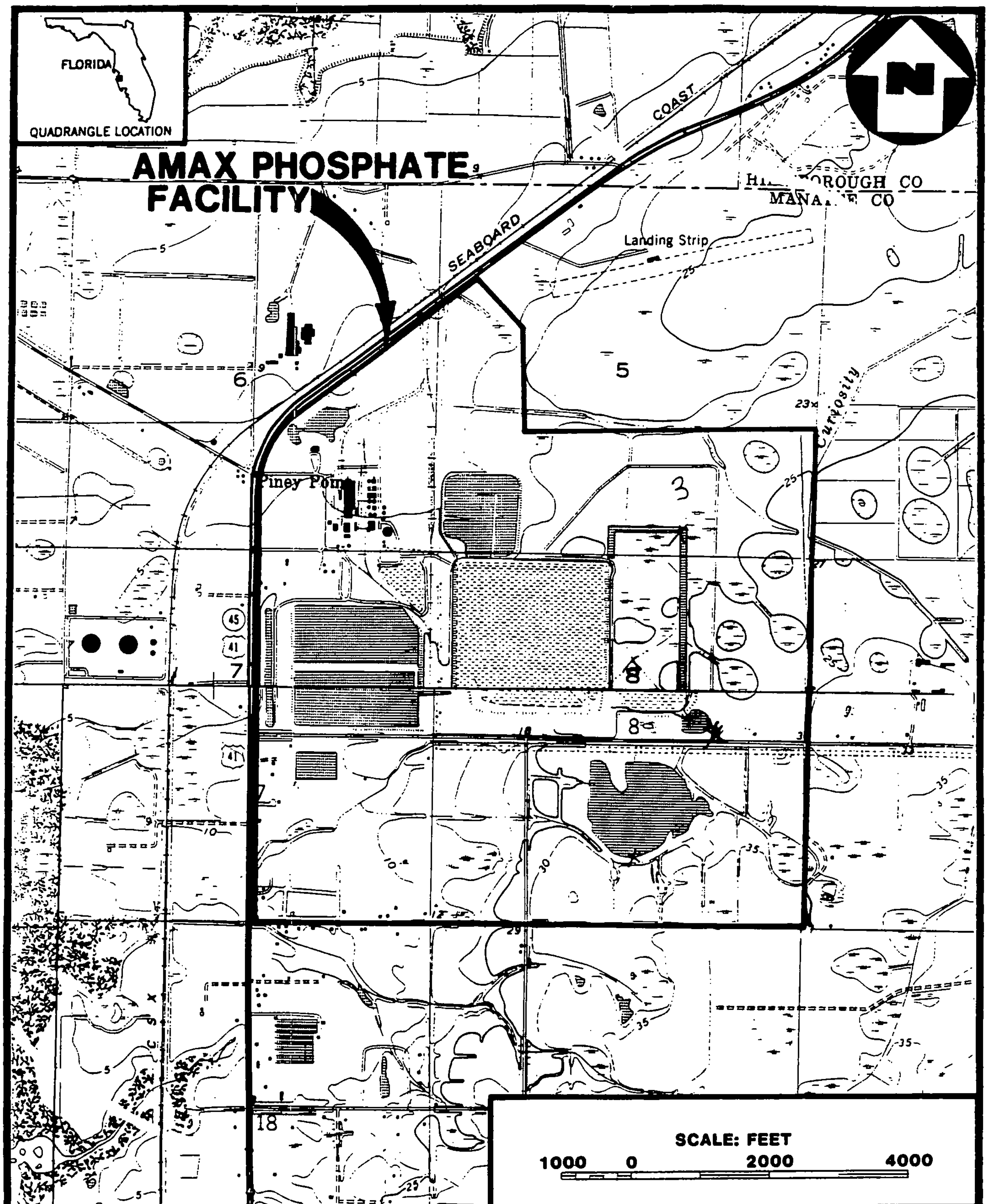
1.6 Site History and Description

The AMAX Phosphate Facility, Piney Point Complex, is located in the northwest section of Manatee County, approximately 0.25 mile inland from Tampa Bay (Refs. 1, 2). The facility was previously owned by the Consolidated Minerals, Inc.; however,it was purchased by Royster sometime in 1988 (Ref. 3). The facility includes sulfuric acid plants, phosphoric acid plants, ammoniated fertilizer plants and gypsum stack/cooling pond complex on approximately 300 acres. Operations began at the facility in 1966 and expanded in 1978 (Ref. 4). A site location map appears on Figure 1 and a site layout map on Figure 2.

After extracting phosphate from ore, gypsum (hydrated calcium sulfate) is produced as a byproduct. It is pumped as a slurry with plant process water to the tops of gypsum stacks for disposal. This process water is characterized as having a very low pH and high concentrations of arsenic, cadium, chromium, lead, sodium, fluoride, manganese, iron, sulfate and total dissolved solids (TDS). High levels of radioactive particle emissions are also typical for the plant process water (Ref. 4).

In addition to calcium sulfate, the process water includes scrubber water from the phosphoric acid and diammonium phosphate plants. This stream is ponded and when possible recycled. Contaminated non-process water, on the other hand, is discharged through two NPDES discharge systems (001, 002). Process water which is not recirculated is treated with lime and discharged through a third outfall (003) (Ref. 5).

All gypsum stack/cooling pond facilities routinely monitor groundwater quality according to approved plans. In September 1983 a groundwater monitoring plan was approved by the Department of Environmental Regulation. This was issued and withdrawn in 1985; then, a second permit was issued in March 1987. The following elevated analyses indicate groundwater quality problems in the surficial aquifer at the AMAX facility: sodium, sulfate, total dissolved solids (TDS), manganese and iron (Ref. 4).



BASE MAP IS A PORTION OF THE U.S.G.S. 7.5 MINUTE QUADRANGLE PALMETTO 1987, COCKROACH BAY 1981, FLORIDA.

SITE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 1

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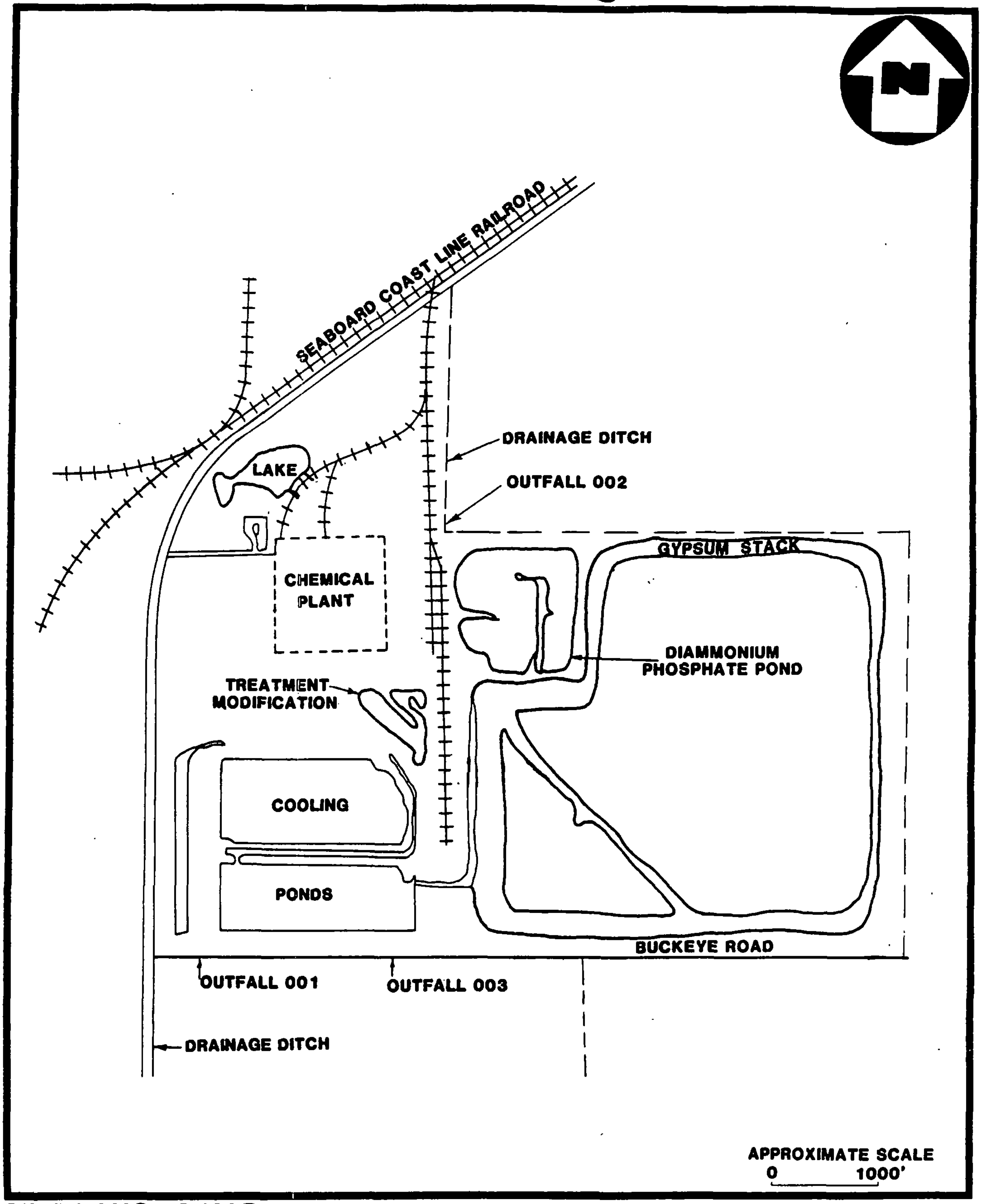

SITE LAYOUT MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 2

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1.7 Regional Hydrogeology

AMAX Phosphate Facility is located in the Atlantic (Gulf) Coastal Plain hydrogeologic regime consisting of complexly interbedded sand, silt, and clay layers which dip toward the coast (Ref. 6). Karst topography is present within the site locale (Ref. 7). The aquifer normally used in this area is the Floridan aquifer located at a depth of 100-200 feet below land surface (bls) (Ref. 7). The clay sediments of the overlying Hawthorn Formation represent the layer of lowest hydraulic conductivity between the Floridan aquifer and land surface. Local soils have been shown to have a hydraulic conductivity in the 1×10^{-5} to 1×10^{-7} range (Ref. 8). The net annual rainfall for this area is 4 inches (Ref. 9). The 1-year, 24-hour rainfall is 4 inches (Ref. 10).

Manatee County supplies many of the residents in the vicinity of the site with potable water from Lake Manatee located approximately 30 miles southeast of the site (Ref. 11). Topographic maps were used to determine the number of private wells within a 4-mile radius of the facility. Approximately 156 private wells were identified within a 3-mile radius of the facility and an additional 20 between the 3- to 4-mile radii (Ref. 2). Also, there are many irrigation wells in the site vicinity used for the many lime, orange, and grapefruit groves. There is a private well on the facility and the nearest offsite well is located approximately 500 feet east of the AMAX gypsum disposal area. The total depth of this well is 600 feet bls; however, the well casing only extends to a depth of 70 to 80 feet (Ref. 11).

As previously mentioned, the facility has three surface water outfalls (Ref. 1). Contaminated, non-process wastewater is discharged through outfalls 001 and 002; nonrecyclable process water is treated and discharged through outfall 003. Outfalls 001 and 003 discharge into Buckeye Road drainage ditch, which flows southward to Bishop Harbor; outfall 002 discharges into Piney Point Creek (Refs. 2). A man-made canal system is used to transport the effluent from the NPDES-permitted outfalls 001 and 002 to Bishop Harbor. However, this waterway is also used to drain runoff from Buckeye Road, U.S. Highway 41, the railroad lines and agriculture fields (Ref. 1).

2.0 SAMPLING INVESTIGATION

The sampling investigation will include the collection of sediment, surface soil, subsurface, surface water and groundwater samples from background and onsite locations. The nearest potable well to the site will also be sampled in addition to an on site well. All sampling locations are tentative. All samples will be analyzed for extractable and purgeable organic compounds, pesticides, PCBs, cyanides and metals. Selected samples will also be analyzed for radium 226/228 and Gross alpha.

Analyses for the organic and inorganic constituents will be performed under the Contract Laboratory Program (CLP), while the radiation samples will be analyzed by the EPA radiation laboratory in Montgomery, Alabama.

2.1 Surface Soil and Gypsum Sampling

Seven surface soil samples will be collected. Four samples will be collected from areas near potential sources of contamination. Two offsite samples will be used to establish background conditions. Additionally,, one gypsum sample will be taken from the gypsum stacks. Analyses for radium 226/228 and gross alpha will be performed on one sample collected from each of the following locations: background, facility area and gypsum stack. Sample codes descriptions and rationale appear on Table 1 and a sample location map on Figure 3.

2.2 Subsurface Soil Sampling

Four subsurface soil samples will be collected in conjunction with the surface soil samples. Two offsite samples will also be collected to establish background conditions. Sample codes, descriptions and rationale appear on Table 1 an a Sample location map on Figure 3.

2.3 Groundwater Sampling

Five groundwater samples will be collected from temporary wells in conjunction with five of the above soil samples. Two of these will serve as background. An additional seven groundwater samples will be collected from existing monitoring wells on site. Five of these are in the surficial aquifer and two in the intermediate aquifer. One potable well at the facility and the closest off site potable well will also be sampled. Analyses for radium 226/228 and Gross alpha will be conducted on the background, one facility surficial aquifer monitoring well, one intermediate aquifer monitoring well and one temporary well. Sample codes, descriptions and rationale appear on Table 2 and a sample location map on Figure 4.

2.4 Surface Water Sampling

Nine surface water samples will be collected. Two will be used to establish background conditions, two will be taken in the areas of the NPDES outfalls and four will be collected downgradient from the respective outfalls. The nineth will be collected from.a cooling pond since acidic sediment may react with metal collecting tools while collecting a sediment sample. Analyses for radium 226/228 and

TABLE 1

SOIL SAMPLE
SAMPLE CODES, LOCATIONS AND RATIONALE
AMAX PHOSPHATE FACLITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Sample Type	Location	Rationale
AP-SS-01	Surface Soil	Area of Curiosity Creek northeast of the facility	Establish background conditions
AP-SS-02	Surface Soil	Area of Cockroach Creek	Establish background conditions
AP-SS-03	Surface Soil	West side of diammonium phosphate pond	Determine migration of contaminants from diammonium phosphate pond
AP-SS-04	Surface Soil	West of chemical plant	Determine migation of contaminants from the chemical plant
AP-SS-05	Surface Soil	West of cooling ponds	Determine migration of contaminants from source areas
AP-SS-06	Surface Soil	Between ditch surrounding gypsum stack and cooling ponds	Determine migration of contaminants from source areas
AP-SS-07	Surface Soil	Gypsum stack	Characterize contaminants in gypsum
AP-SB-01	Subsurface Soil	In conjunction with AP-SS-01	Establish background conditions
AP-SB-02	Subsurface Soil	In conjuction with AP-SS-02	Establish background conditions
AP-SB-03	Subsurface Soil	In conjunction with AP-SS-03	Determine migration of contaminants from diammonium phosphate pond
AP-SB-04	Subsurface Soil	In conjunction with AP-SS-04	Determine migration of contaminants from the chemical plant.

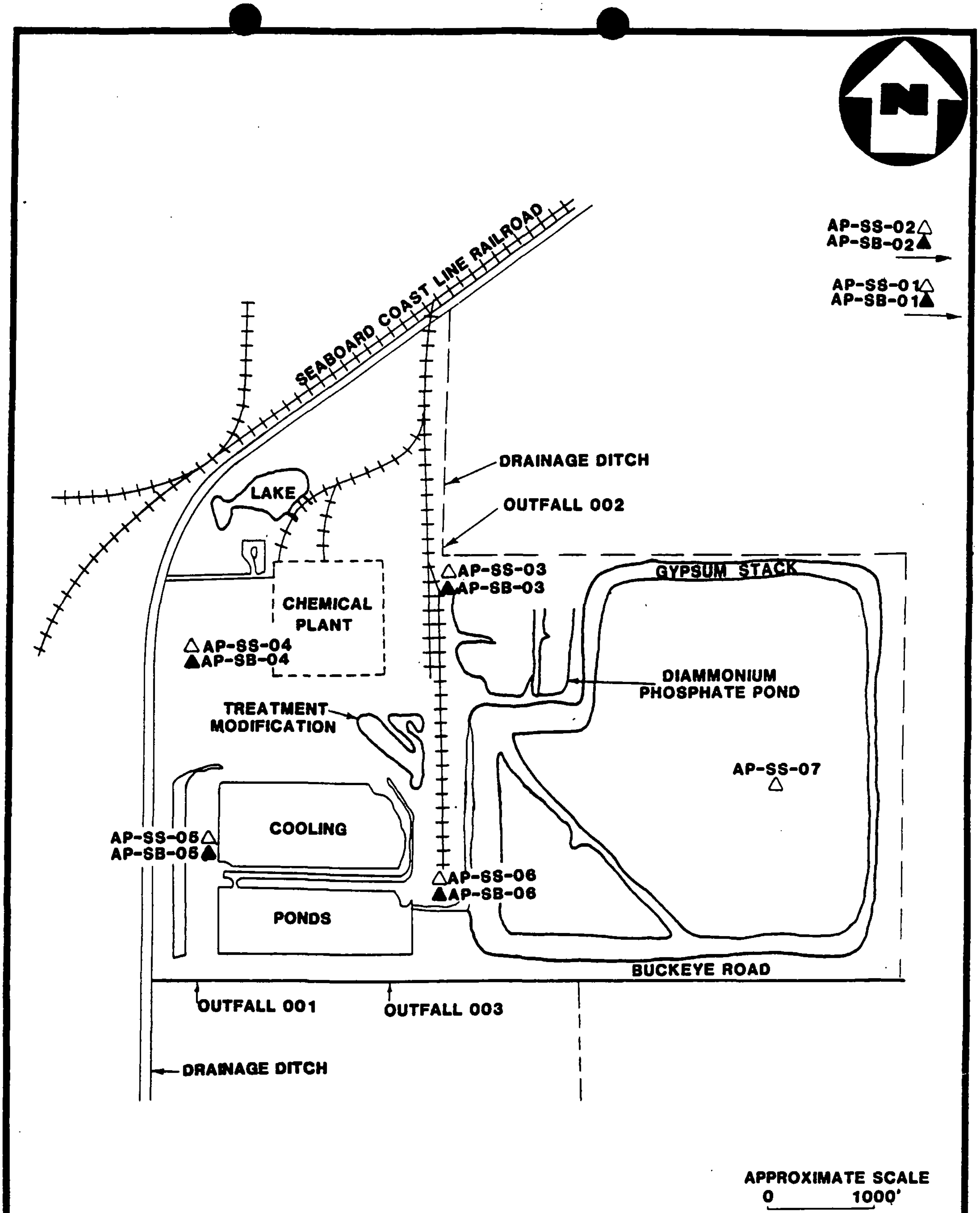
AP - AMAX Phosphate
SS - Surface Soil
SB - Subsurface Soil

TABLE 1

SOIL SAMPLE
SAMPLE CODES, LOCATIONS AND RATIONALE
AMAX PHOSPHATE FACLITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Sample Type	Location	Rationale
AP-SB-05	Subsurface Soil	In conjunction with AP-SS-05	Determine migration of contaminants from source areas
AP-SB-06	Subsurface Soil	In conjunction with AP-SS-06	Determine migration of contamination from gypsum stacks

AP - AMAX Phosphate
SS - Surface Soil
SB - Subsurface Soil



SOIL SAMPLE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 3

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TABLE 2

GROUNDWATER SAMPLE
SAMPLE CODES, LOCATIONS AND RATIONALE
AMAX PHOSPHATE FACLITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Sample Type	Location	Rationale
AP-TW-01	Groundwater	In conjunction with AP-SS-01	Establish background conditions
AP-TW-02	Groundwater	In conjunction with AP-SS-02	Establish background conditions
AP-TW-03	Groundwater	In conjunction with AP-SS-03	Determine migration of contaminants from diammonium phosphate pond
AP-TW-04	Groundwater	In conjunction with AP-SS-04	Determine migration of contaminants from the chemical plant
AP-TW-05	Groundwater	In conjunction with AP-SS-05	Determine migration of contaminants from source areas
AP-MW-01	Groundwater	Monitoring well 1, surficial aquifer, southeast corner	Detemine migration of contaminants to groundwater
AP-MW-02	Groundwater	Monitoring well 2, surficial aquifer, south of ditch surrounding gypsum stack	Detemine migration of contaminants to groundwater
AP-MW-03	Groundwater	Monitoring well 3, surficial aquifer, east of chemical plant	Detemine migration of contaminants to groundwater
AP-MW-04	Groundwater	Monitoring well 4, surficial aquifer, north of cooling ponds	Detemine migration of contaminants to groundwater
AP-MW-5	Groundwater	Monitoring well 5, surficial aquifer, south of Buckeye Road	Detemine migration of contaminants to groundwater

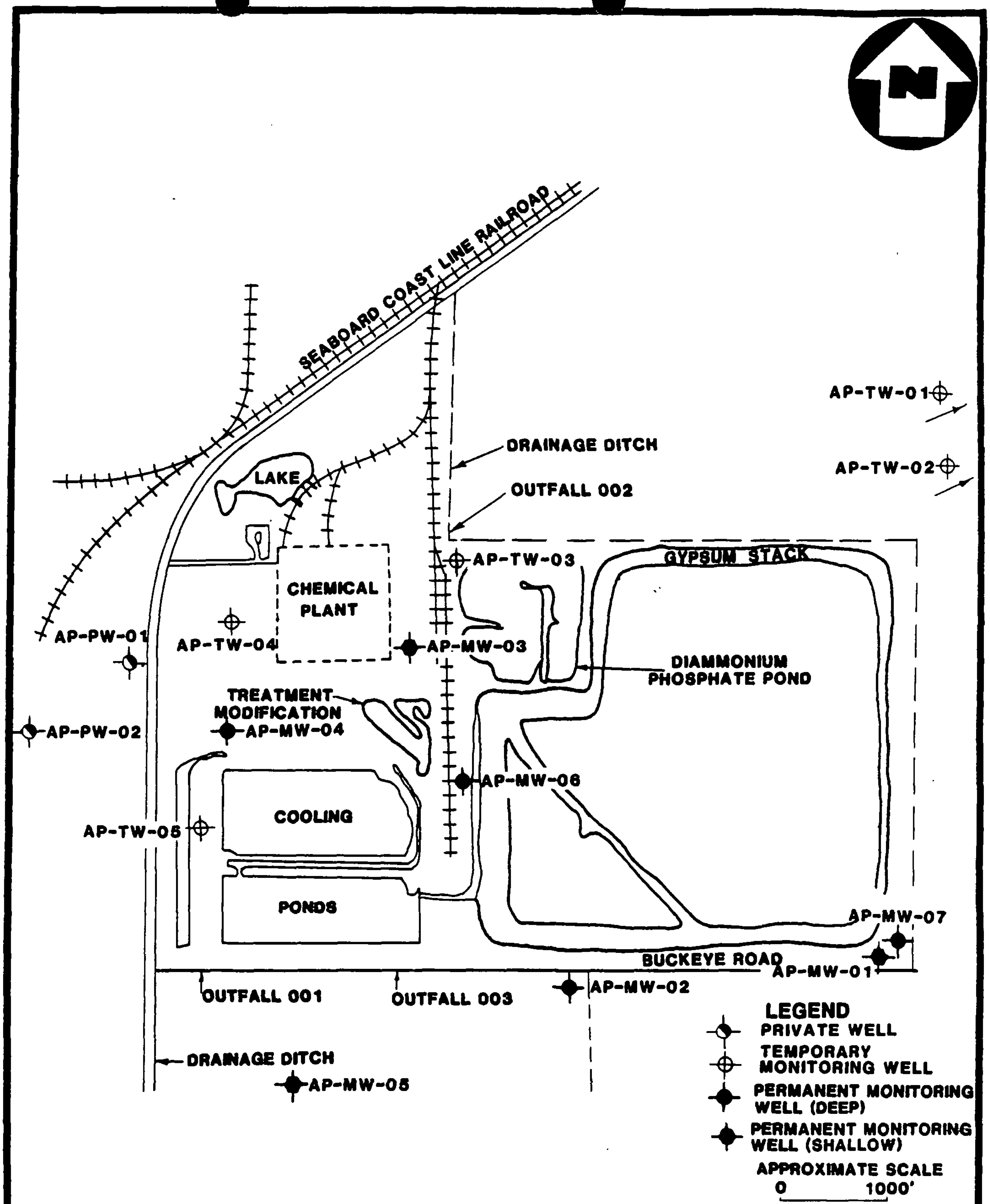
AP - AMAX Phosphate
TW - Temporay Well
MW - Monitoring Well
PW - Private Well

TABLE 2

GROUNDWATER SAMPLE
SAMPLE CODES, LOCATIONS AND RATIONALE
AMAX PHOSPHATE FACLITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Sample Type	Location	Rationale
AP-MW-06	Groundwater	Monitoring well 6, intermediate aqifers, west of the ditch surrounding gypsum stack	Detemine migration of contaminants to groundwater
AP-MW-07	Groundwater	Monitoring well 7, intermediate aquifer, southeast corner	Detemine migration of contaminants to groundwater
AP-PW-01	Groundwater	Private well used by facility	Determine migration of contaminants to potable water
AP-PW-02	Groundwater	Private well, nearest to facility	Determine migration of contaminants to potable water

AP - AMAX Phosphate
TW - Temporay Well
MW - Monitoring Well
PW - Private Well



GROUNDWATER SAMPLE LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 4

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TABLE 3

SEDIMENT AND SURFACE WATER
SAMPLE CODES, LOCATIONS AND RATIONALE
AMAX PHOSPHATE FACLITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Sample Type	Location	Rationale
AP-SW-01	Surface Water	Curiosity Creek upgradient from facility	Establish background conditions
AP-SW-02	Surface Water	Cockroach Creek northeast of facility	Establish background conditions
AP-SW-03	Surface Water	West of outfalls 001 and 003	Characterize contaminants from NPDES discharge
AP-SW-04	Surface Water	Downgradient from outfalls 001 and 003	Determine migration of contaminants
AP-SW-05	Surface Water	Bishop Harbor downgradient from outfalls 001 and 003	Determine migration of contaminants
AP-SW-06	Surface Water	Outfall 002	Characterize contaminants from NPDES discharge
AP-SW-07	Surface Water	Downgradient from outfall 002 in Piney Point Creek	Detemine migration of contamination
AP-SW-08	Surface Water	Piney Point Creek at Tampa Bay	Detemine migration of contamination
AP-SW-09	Surface Water	Cooling Pond	Characterize contaminants
AP-SD-01	Sediment	In conjunction with AP-SW-01	Establish background condition
AP-SD-02	Sediment	In conjunctionwith AP-SW-02	Establish background condition
AP-SD-03	Sediment	In conjunction with AP-SW-03	Characterize contaminants from NPDES discharge
AP-SD-04	Sediment	In conjunction with AP-SW-04	Determine migration of contaminants
AP-SD-05	Sediment	In conjunction with AP-SW-05	Determine migration of contaminants
AP-SD-06	Sediment	In conjunction with AP-SW-06	Characterize contaminants from NPDES discharge

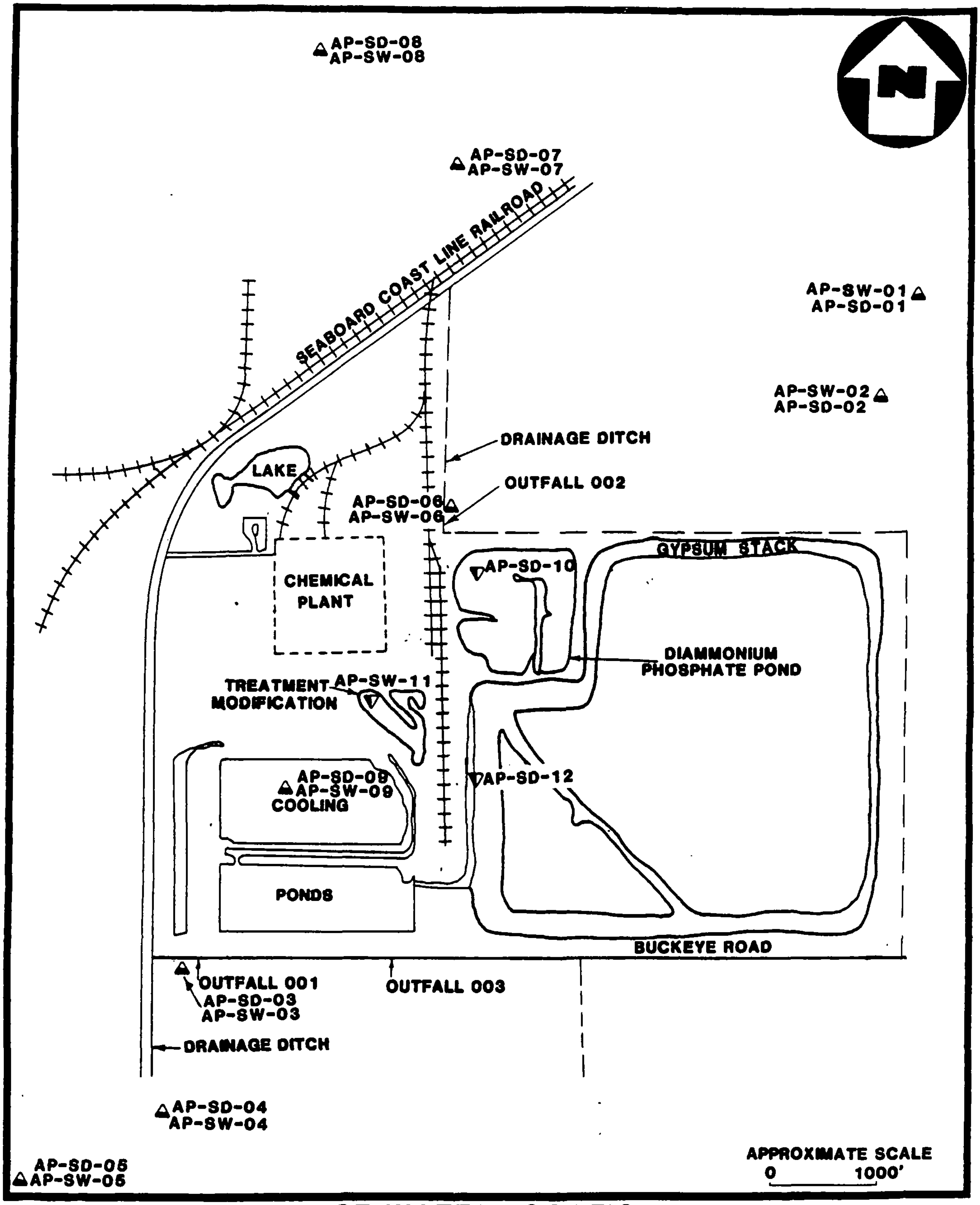
AP - AMAX Phosphate
SW - Surface Water
SD - Sediment

TABLE 3

SEDIMENT AND SURFACE WATER
SAMPLE CODES, LOCATIONS AND RATIONALE
AMAX PHOSPHATE FACLITY
PALMETTO, MANATEE COUNTY, FLORIDA

Sample Code	Sample Type	Location	Rationale
AP-SD-07	Sediment	In conjunction with AP-SW-07	Determine migration of contaminants
AP-SD-08	Sediment	In conjunction with AP-SW-08	Determine migration of contaminants
AP-SD-09	Sediment	In conjunction with AP-SW-09	Characterize contaminants
AP-SD-10	Sediment	Diammonium phosphate pond	Characterize contaminants
AP-SD-11	Sediment	Treatment modification pond	Characterize contaminants
AP-SD-12	Sediment	Drainage ditch around gypsum stacks	Determine migration of contaminants

AP - AMAX Phosphate
SW - Surface Water
SD - Sediment



SEDIMENT AND SURFACE WATER LOCATION MAP
AMAX PHOSPHATE
PALMETTO, MANATEE COUNTY, FLORIDA

FIGURE 5

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Gross alpha will be performed on one sample collected from each of the following locations: background, and NPDES outfalls.Sample codes, descriptions and rationale appear on Table 3 and sample location map on Figure 5.

2.5 Sediment Sampling

Nine sediment samples will be collected at the same sample locations as the above surface water samples. An additional three sediment samples will be taken at contamination source areas around the facility to include: the ditch surrounding the gypsum stack, diammonium phosphate pond and treatment modification pond. Analyses for radium 226/228 and Gross alpha will be performed on one sample collected from each of the following locations: background, NPDES outfalls and ditch surrounding gypsum stack. Sample codes, descriptions and rationale appear on Table 3 and a sample location map on Figure 5.

2.6 Analytical and Container Requirements

Sample containers used will be in accordance with the requirements specified in the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division, April 1, 1986. The following is a description of the analysis and types of containers required.

Analyses	Container	Preservatives**
Ext. Organics, Water	1 gal., amber glass*	None
Volatile Organics, Water	40 ml., glass vial*	4 drops conc. HCL to pH <2
Metals, Water	1 liter, plastic	50% HNO_3 to pH <2
Cyanide, Water	1 liter, plastic	NaOH to pH >12
Ext. Organics, Soil/Sediment	8 oz., glass*	None
Volatile Organics Soil/Sediment	4 oz., glass*	None

Inorganics, Soil/Sediment	8 oz., glass*	None

* Sample container lids are lined with teflon.

** All samples will be iced to 4°C upon collection.

2.7 Methodology

All sample collection, sample preservation, and chain-of-custody procedures used during this investigation will be in accordance with the standard operating procedures as specified in Section 3 and 4 of the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division, April 1, 1986.

All laboratory analyses and laboratory quality assurance procedures used during this investigation will be in accordance with standard procedures and protocols as specified in the Analytical Support Branch Operations and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division; revised June 1, 1985 or as specified by the existing United States Environmental Protection Agency standard procedures and protocols for the contract analytical laboratory program.

REFERENCES

1. John G. Cladakis, Senior Vice President, AMAX Chemical Corporation, letter to Dale Twachtmann, Secretary, Department of Environmental Regulation, February 25, 1987. Subject: Industrial Wastewater Permit.

2. U.S. Geological Survey, 7.5 minute series Topographic Quadrangle Maps of Florida: Cockroach Bay 1981, Ruskin 1969, Palmetto 1987, Parrish 1987. Scale 1:24,000.

3. Al Bishop, Point Source Evaluation Section, FDER, Interoffice Memorandum and Attachment, to Sam Sahebzamani, Southwest District, September 28, 1988. Subject: WQBEL for Royster Phosphate Piney Point Facility.

4. Florida Department of Environmental Regulation, Gypsum Stack Status Report, (Southwest District, November 1988).

5. Florida Department of Environmental Regulation, Operational Permit (Number I041-129068) issued to John G. Cladakis, senior vice president, Consolidated Minerals, Inc., May 15, 1987.

6. Linda Aller, et al., DRASTIC: A Standardized System for Evaluating Ground Water Pollution Using Hydrogeologic Settings, EPA-600/2-87-035 (Ada, Oklahoma: USEPA, April, 1987).

7. C.G. Menke, E.W. Meredith, and W.S. Wetterhall, Water Resources of Hillsborough County, Florida, Florida Geological Survey Report of Investigations No. 25 (Tallahassee, 1961).

8. R. Allen Freeze and John A. Cherry, Groundwater (Englewood Cliffs, New Jersey: Prentice Hall, 1979).

9. U.S. Department of Commerce, Climatic Atlas of the United States, (Washington, D.C.: GPO June 1968) Reprint: 1983, National Oceanic and Atmospheric Administration.

10. U.S. Dept. of Commerce, Rainfall Frequency Atlas of the United States, Technical Paper No. 40, (Washington, D.C.: GPO, 1961).

11. NUS Corporation Field Logbook No. F4-1606, for AMAX Phosphate Corporation, TDD No. F4-8905-59. Documentation of facility offsite reconnaissance September 6, 1989.

NUS
CORPORATION

1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404-938-7710

C-586-12-9-60

December 6, 1989

Mr. A. R. Hanke
Site Investigation and Support Branch
Waste Management Division
Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Subject: Screening Site Inspection, Phase I
Amax Phosphate Facility
Palmetto, Manatee County, Florida
EPA ID No. FLD043055151
TDD No. F4-8905-59

Dear Mr. Hanke:

Enclosed, please find two (2) copies of the Screening Site Inspection, Phase I report for Amax Phosphate Facility, located in Palmetto, Manatee County, Florida.

Please contact me if you have any questions concerning the Screening Site Inspection, Phase I report.

Very truly yours,

Ralph Hazelton
Project Manager

Approved:

Greg Schank

RH/kw

Enclosures (2)

cc: Dorothy Rayfield

NUS CORPORATION

1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404-938-7710

C-586-12-9-8

December 6, 1989

Mr. A. R. Hanke
Site Investigation and Support Branch
Waste Management Division
Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Date: 12/14/89
Site Disposition: SSI phase II
EPA Project Manager: D Rayfield

Subject: Screening Site Inspection, Phase I
Amax Phosphate Facility
Palmetto, Manatee County, Florida
EPA ID No. FLD043055151
TDD No. F4-8905-59

Dear Mr. Hanke:

FIT 4 conducted a Phase I Screening Site Inspection of the Amax Phosphate Facility located in Palmetto, Manatee County, Florida. This inspection included a review of EPA and state file material, completion of a target survey, and a reconnaissance of the site on September 6, 1989.

The Amax Phosphate Facility, Piney Point Complex, is located in the northwest section of Manatee County, approximately one-quarter mile inland from Tampa Bay (Refs. 1, 2). The facility was previously owned by Consolidated Minerals, Inc.; however, it was purchased by Royster sometime in 1988 (Ref. 3). The facility includes sulfuric acid plants, phosphoric acid plants, ammoniated fertilizer plants and a gypsum stack/cooling pond complex on approximately 300 acres. Operations began at the facility in 1966 and expanded in 1978 (Ref. 4).

Generally, 95 percent of the phosphate produced in Florida is used in agriculture; 90 percent goes into fertilizers, and 5 percent is used in livestock feed supplements. Large quantities of calcium sulfate (gypsum) are produced as a by-product during the manufacture of phosphoric acid. The calcium sulfate transport water and scrubber water from the phosphoric acid and diammonium phosphate plants make up the process wastewater (Refs. 5, 6). Uranium, vanadium, selenium, chromium can be present in sufficient concentrations to constitute actual or potential by-products (Ref. 7). This wastewater stream is ponded and may be reused to some extent (Ref. 6). The treatment process generates calcium fluoride and calcium phosphate sludge. These sludges are also disposed of in the gypsum disposal area (Ref. 1). Amax's gypsum disposal area is located adjacent to Buckeye Road and is approximately 3,500 square feet in size (Ref. 2).

A groundwater monitoring plan was submitted to the Department of Environmental Regulation in September 1983 and was approved. A groundwater monitoring permit was issued on September 9, 1985, but was withdrawn on October 23,1985. A second permit for groundwater monitoring was issued on March 14, 1987. The following groundwater quality problems have been reported in the surficial aquifer at this facility: sodium (180 mg/l), sulfate (745 mg/l), iron (2.9 mg/l), manganese (0.31 mg/l) and total dissolved solids (1586 mg/l) (Ref. 4).

Amax Phosphate Facility is located in the Atlantic (Gulf) Coastal Plain hydrogeologic regime consisting of complexly interbedded sand, silt, and clay layers which dip toward the coast (Ref. 8). Karst topography is present within the site locale (Ref. 9). The aquifer normally used in this area is the Floridan aquifer located at a depth of 100-200 feet below land surface (bls) (Ref. 9). The clay sediments of the overlying Hawthorn Formation represent the layer of lowest hydraulic conductivity between the Floridan aquifer and land surface. Local soils have been shown to have a hydraulic conductivity in the $1x10^{-5}$ to $1x10^{-7}$ range (Ref. 10). The net annual rainfall for this area is 4 inches (Ref. 11). The 1-year, 24-hour rainfall is 4 inches (Ref. 12).

The facility has three surface water outfalls (Ref. 1). ~~Contaminated~~, Non-process wastewater is discharged through outfalls 001 and 002; nonrecyclable process water is treated and discharged through outfall 003. Outfalls 001 and 003 discharge into Buckeye Road drainage ditch, which flows southward to Bishop Harbor; outfall 002 discharges into Piney Point Creek (Refs. 2, 5). A man-made canal system is used to transport the effluent from the NPDES-permitted outfalls 001 and 002 to Bishop Harbor. However, this waterway is also used to drain runoff from Buckeye Road, U.S. Highway 41, the railroad lines and agriculture fields (Ref. 1).

During the drive-by reconnaissance, no fishing or any other recreational use was observed in the canal system, although there are numerous species of freshwater fish in the waterway. Numerous fishermen were observed, however, within 1,000 feet of where the outfall discharges into Bishop Harbor (Ref. 13).

Manatee County supplies many of the residents in the vicinity of the site with potable water from Lake Manatee located approximately 30 miles southeast of the site (Ref. 13).

Topographic maps were used to determine the number of private wells within a 4-mile radius of the facility. Approximately 156 private wells identified within a 3-mile radius of the facility and an additional 20 between the 3- to 4-mile radii (Ref. 2). Also, there are many irrigation wells in the site vicinity used for the many lime, orange, and grapefruit groves. There is a private well on the facility and the nearest offsite well is located approximately 500 feet east of the Amax gypsum disposal area. The total depth of this well is 600 feet bls; however, the well casing only extends to a depth of 70 to 80 feet (Ref. 13).

There are no schools or day-care centers within 4 miles of the facility (Ref. 13). The facility is semi-secure with fences around the gypsum disposal area and "No Trespassing" signs are posted (Ref. 13). The Tampa Bay, Cockroach Bay and Bishop Harbor are natural habitats for the federally endangered Florida manatee (Ref. 14).

Mr. A.R. Hanke
Environmental Protection Agency
TDD No. F4-8905-59
December 6, 1989 - page 3

Based on the factors observed, the information presented and attachments, FIT 4 recommends a Phase II Screening Site Inspection be conducted on a high priority basis for Amax Phosphate Facility. If you have any questions concerning this site, please contact me at NUS Corporation.

Very truly yours,

Ralph Hazelton
Project Manager

Approved:

RH/gwn

Enclosures

cc: Dorothy Rayfield

REFERENCES

1. John G. Cladakis, Senior Vice President, Amax Chemical Corporation, letter to Dale Twachtmann, Secretary, Department of Environmental Regulation, February 25, 1987. Subject: Industrial Wastewater Permit.

2. U.S. Geological Survey, 7.5 minute series Topographic Quadrangle Maps of Florida: Cockroach Bay 1981, Ruskin 1969, Palmetto 1987, Parrish 1987. Scale 1:24,000.

3. Al Bishop, Point Source Evaluation Section, FDER, Interoffice Memorandum and Attachment, to Sam Sahebzamani, Southwest District, September 28, 1988. Subject: WQBEL for Royster Phosphate Piney Point Facility.

4. Florida Department of Environmental Regulation, Gypsum Stack Status Report, (Southwest District, November 1988).

5. Florida Phosphate Council, Billions of Years Ago, (Lakeland, Florida, 1988).

6. Florida Department of Environmental Regulation, Operational Permit (Number I041-129068) issued to John G. Cladakis, senior vice president, Consolidated Minerals, Inc., May 15, 1987.

7. Robert F. Kaufmann, James D. Bliss, et al., Effects of Phosphate Mineralization and the Phosphate Industry on Radium-226 in Ground Water of Central Florida, EPA-520-6-77-010 (Ada, Las Vegas, Nevada: USEPA, October 1977).

8. Linda Aller, et al., DRASTIC: A Standardized System for Evaluating Ground Water Pollution Using Hydrogeologic Settings, EPA-600/2-87-035 (Ada, Oklahoma: USEPA, April, 1987).

9. C.G. Menke, E.W. Meredith, and W.S. Wetterhall, Water Resources of Hillsborough County, Florida, Florida Geological Survey Report of Investigations No. 25 (Tallahassee, 1961).

10. R. Allen Freeze and John A. Cherry, Groundwater (Englewood Cliffs, New Jersey: Prentice Hall, 1979).

11. U.S. Department of Commerce, Climatic Atlas of the United States, (Washington, D.C.: GPO June 1968) Reprint: 1983, National Oceanic and Atmospheric Administration.

12. U.S. Dept. of Commerce, Rainfall Frequency Atlas of the United States, Technical Paper No. 40, (Washington, D.C.: GPO, 1961).

13. NUS Corporation Field Logbook No. F4-1606, for Amax Phosphate Corporation, TDD No. F4-8905-59. Documentation of facility offsite reconnaissance September 6, 1989.

14. U.S. Fish and Wildlife Service, Gulf Coast, Inventory Map of St. Petersburg, Florida, 1:250,000 (1982).

RECONNAISSANCE CHECKLIST FOR HRS2 CONCERNS

Instructions: Obtain as much "up front" information as possible prior to conducting fieldwork. Complete the form in as much detail as you can, providing attachments as necessary. Cite the source for all information obtained.

Site Name: AMAX PHOSPHATE FACILITY
City, County, State: PALMETTO, MANATEE COUNTY, FLORIDA
EPA ID No.: FLD043055151
Person responsible for form: R. HAZELTON
Date: Sept. 6, 1989

Air Pathway

Describe any potential air emission sources onsite: NONE OBSERVED

Identify any sensitive environments within 4 miles: TAMPA BAY, COCKROACH BAY AND BISHOP HARBOR LOCATED WEST OF THE FACILITY. ORANGE, LIME, AND GRAPEFRUIT GROVES IN THE SITE VICINITY.

Identify the maximally exposed individual (nearest residence or regularly occupied building - workers do count): SITE IS ACTIVE; NUMBER OF WORKERS UNKNOWN, NEAREST RESIDENT IS APPROX 500 feet EAST OF GYPSUM DISPOSAL AREA.

Groundwater Pathway

Identify any areas of karst terrain: KARST Topography IS PRESENT AT THE SITE LOCALE

Identify additional population due to consideration of wells completed in overlying aquifers to the AOC: MANY WELLS IN THE VICINITY OF THE SITE ARE ARTESIAN WITH SHALLOW CASTING,

Do significant targets exist between 3 and 4 miles from the site? Approx. 20 ADDITIONAL PRIVATE WELLS

Is the AOC a sole source aquifer according to Safe Drinking Water Act? (i.e. is the site located in Dade, Broward, Volusia, Putnam, or Flagler County, Florida): YES

Surface Water Pathway

Are there intakes located on the extended 15-mile migration pathway? NONE

Are there recreational areas, sensitive environments, or human food chain targets (fisheries) along the extended pathway? Bay AREA USED for fishing. FLORIDA MANATEE FOUND IN BAY AREA. FRUIT TREES AND FISHERS in the AREA NO ALONG Migration PATHWAY

Onsite Exposure Pathway

Is there waste or contaminated soil onsite at 2 feet below land surface or higher? YES. GYPSUM MOUNDS

Is the site accessible to non-employees (workers do not count)? SEMI-FENCED, NO TRESPASSING SIGNS POSTED

Are there residences, schools, or day care centers onsite or in close proximity? NO

Are there barriers to travel (e.g., a river) within one mile? NONE

HAZARD RANKING SYSTEM SCORING SUMMARY

FOR

AMAX PHOSPHATE FACILITY
EPA SITE NUMBER FLD043055151
PALMETTO
MANATEE COUNTY, FL
EPA REGION: 4

SCORE STATUS: IN PREPARATION

SCORED BY R. HAZELTON
OF NUS CORPORATION
ON 11/28/89

DATE OF THIS REPORT: 12/06/89
DATE OF LAST MODIFICATION: 12/06/89

GROUND WATER ROUTE SCORE	:	47.35
SURFACE WATER ROUTE SCORE	:	14.55
AIR ROUTE SCORE	:	0.00
MIGRATION SCORE	:	28.64

SITE: AMAX PHOSPHATE FACILITY

HRS GROUND WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0
2. ROUTE CHARACTERISTICS			
DEPTH TO WATER TABLE	6 FEET		
DEPTH TO BOTTOM OF WASTE	5 FEET		
DEPTH TO AQUIFER OF CONCERN	1 FEET	3	6
PRECIPITATION	52.0 INCHES		
EVAPORATION	48.0 INCHES		
NET PRECIPITATION	4.0 INCHES	1	1
PERMEABILITY	1.0X10-3 CM/SEC	2	2
PHYSICAL STATE		3	3
TOTAL ROUTE CHARACTERISTICS SCORE:			12
3. CONTAINMENT		3	3
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:ASSIGNED VALUE,18			18
WASTE QUANTITY CUBIC YDS	2501		
DRUMS	0		
GALLONS	0		
TONS	0		
TOTAL	2501 CU. YDS	8	8
TOTAL WASTE CHARACTERISTICS SCORE:			26
5. TARGETS			
GROUND WATER USE		3	9
DISTANCE TO NEAREST WELL	500 FEET		
AND	MATRIX VALUE	20	20
TOTAL POPULATION SERVED	593 PERSONS		
NUMBER OF HOUSES	136		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	0		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			29

GROUND WATER ROUTE SCORE (Sgw) = 47.35

HRS SURFACE WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0
2. ROUTE CHARACTERISTICS			
SITE LOCATED IN SURFACE WATER	NO		
SITE WITHIN CLOSED BASIN	NO		
FACILITY SLOPE	0.0 %		
INTERVENING SLOPE	0.0 %	0	0
24-HOUR RAINFALL	4.0 INCHES	3	3
DISTANCE TO DOWN-SLOPE WATER	1000 FEET	2	4
PHYSICAL STATE	3		3
TOTAL ROUTE CHARACTERISTICS SCORE:			10
3. CONTAINMENT	3		3
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:ASSIGNED VALUE,18			18
WASTE QUANTITY CUBIC YDS	2501		
DRUMS	0		
GALLONS	0		
TONS	0		
TOTAL	2501 CU. YDS	8	8
TOTAL WASTE CHARACTERISTICS SCORE:			26
5. TARGETS			
SURFACE WATER USE		2	6
DISTANCE TO SENSITIVE ENVIRONMENTS		3	6
COASTAL WETLANDS	2000 FEET		
FRESH-WATER WETLANDS	3000 FEET		
CRITICAL HABITAT	2000 FEET		
DISTANCE TO STATIC WATER	7500 FEET		
DISTANCE TO WATER SUPPLY INTAKE	> 1 MILE		
AND	MATRIX VALUE	0	0
TOTAL POPULATION SERVED	0		
NUMBER OF HOUSES	0		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	0		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			12

SURFACE WATER ROUTE SCORE (Ssw) = 14.55

HRS AIR ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0
2. WASTE CHARACTERISTICS			
REACTIVITY:		MATRIX VALUE	
INCOMPATIBILITY			
TOXICITY			
WASTE QUANTITY CUBIC YARDS			
DRUMS			
GALLONS			
TONS			
TOTAL			
TOTAL WASTE CHARACTERISTICS SCORE:			N/A
3. TARGETS			
POPULATION WITHIN 4-MILE RADIUS			
0 to 0.25 mile			
0 to 0.50 mile			
0 to 1.0 mile			
0 to 4.0 miles			
DISTANCE TO SENSITIVE ENVIRONMENTS			
COASTAL WETLANDS			
FRESH-WATER WETLANDS			
CRITICAL HABITAT			
DISTANCE TO LAND USES			
COMMERCIAL/INDUSTRIAL			
PARK/FOREST/RESIDENTIAL			
AGRICULTURAL LAND			
PRIME FARMLAND			
HISTORIC SITE WITHIN VIEW?			
TOTAL TARGETS SCORE:			N/A

AIR ROUTE SCORE (Sa) = 0.00

HAZARD RANKING SYSTEM SCORING CALCULATIONS
FOR
SITE: AMAX PHOSPHATE FACILITY
AS OF 12/06/89

GROUND WATER ROUTE SCORE

ROUTE CHARACTERISTICS		12
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	26
TARGETS	X	29

= 27144 /57,330 X 100 = 47.35 = S_{gw}

SURFACE WATER ROUTE SCORE

ROUTE CHARACTERISTICS		10
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	26
TARGETS	X	12

= 9360 /64,350 X 100 = 14.55 = S_{sw}

AIR ROUTE SCORE

OBSERVED RELEASE 0 /35,100 X 100 = 0.00 = S_{air}

SUMMARY OF MIGRATION SCORE CALCULATIONS

	S	S^2
GROUND WATER ROUTE SCORE (S_{gw})	47.35	2242.02
SURFACE WATER ROUTE SCORE (S_{sw})	14.55	211.70
AIR ROUTE SCORE (S_{air})	0.00	0.00
$S^2_{gw} + S^2_{sw} + S^2_{air}$		2453.72
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}$		49.54
$S_M = \sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}/1.73$		28.64

FLD043055151

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
COLLEGE STATION RD.
ATHENS, GA 30613

MEMORANDUM

DATE: 01/23/91

SUBJECT: Results of Radiochemical Analyses
Projects 91-025, AMAX Phosphate;
90-439, IMC/New Wales;
90-440, Farmland Ind.

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: Phil Blackwell,
NUS Corporation

Attached are partial results of sample analyses for the subject projects. The analyses were performed by the U.S. EPA Eastern Environmental Radiation Laboratory, Montgomery, AL. As you can see from the brief memorandum attached to the data, results for radium 226 in soil and radium 228 in waters are still pending. These results will be forwarded to you as soon as they are received by ESD.

Please note that for two samples, IMC/New Wales TW-01, and Farmland Industries TW-01, two radium 226 values were reported for each sample. According to the laboratory's explanation, these two samples were filtered and the analysis was performed on both the filtrate and solids portions of the each. By each radium 226 value for the two samples, the result has been labeled either "filtered", or "solids", to denote which fraction of the sample the result is associated with.

A QA review was not performed on the radiochemical analyses. If you have technical questions concerning the data, please contact the individuals listed on the laboratory's cover memo.

ATTACHMENT

cc: Al Hanke, WMD, w/o attachment

Dorothy Bayfield

SITE AMAX PHOSPHATE (FIT) STATE FL MANAGER ROGER FRANKLIN (NUS)
PROJECT # 91-025 SHIPWEEK 10/15/90

SOILVOA BOOKED	29	DATA RECEIVED	01/14/91	FOR	25	SAMPLES
H2OVOA BOOKED	24	DATA RECEIVED	01/14/91	FOR	21	SAMPLES
SOILEXT BOOKED	28	DATA RECEIVED	01/14/91	FOR	24	SAMPLES
H2OEXT BOOKED	24	DATA RECEIVED	01/14/91	FOR	21	SAMPLES
SOILPEST BOOKED	28	DATA RECEIVED	01/14/91	FOR	24	SAMPLES
H2OPEST BOOKED	24	DATA RECEIVED	01/14/91	FOR	21	SAMPLES
SOILMET BOOKED	28	DATA RECEIVED	12/10/90	FOR	24	SAMPLES
H2OMET BOOKED	24	DATA RECEIVED	12/10/90	FOR	21	SAMPLES
SOILCN BOOKED	28	DATA RECEIVED	12/10/90	FOR	24	SAMPLES
H2OCN BOOKED	24	DATA RECEIVED	12/10/90	FOR	21	SAMPLES
SOILOTH1 BOOKED	7	DATA RECEIVED	/ /	FOR		SAMPLES
SOILOTH2 BOOKED	0	DATA RECEIVED	/ /	FOR		SAMPLES
H2OOTH1 BOOKED	7	DATA RECEIVED	/ /	FOR		SAMPLES
H2OOTH2 BOOKED	0	DATA RECEIVED	/ /	FOR		SAMPLES
OTHER1 BOOKED	0	DATA RECEIVED	/ /	FOR		SAMPLES
OTHER2 BOOKED	0	DATA RECEIVED	/ /	FOR		SAMPLES

OV REQUESTED? N

LAB(CLP/ESD) clp

SISB/SAS
RECEIVED
JAN 22 1991
EPA - REGION IV
ATLANTA, GA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

SISB/SAS
RECEIVED
JAN 22 1991
EPA - REGION IV
ATLANTA GA.

*****MEMORANDUM******

DATE: 01/05/91

SUBJECT: Results of Purgeable Organic Analysis;
91-025 AMAX PHOSPHATE FACIL
PALMETTO FL
CASE NO: 15099

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

cc:

ORGANIC DATA QUALIFIER REPORT

Case Number 15099 Project Number 91-025 SAS Number

Site ID. Amax Phosphate Facil, Palmetto, FL.

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
DY143,157,158,161, 163,165,167,169, 172,175,327-329	2-butanone	R	low response factor
DY158	carbon disulfide	J	<quantitation limit
Extractables			
all samples	di-n-butylphthalate	J	low QC spike recovery
	benzo(a)anthracene	J	low QC spike recovery
DY146	all positives	J	<quantitation limit
Pesticides			
none			

ORGANIC DATA QUALIFIER REPORT

Case Number 15099 Project Number 91-025 SAS Number

Site ID. Amax Phosphate Facil, Palmetto, FL.

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
DY173,170,152,155, 140,138,144	all positives	J	<quantitation limit
Extractables			
all samples	bis(2-chloroisopropyl)ether	R	unacceptable recovery blind spike
	nitrobenzene	R	unacceptable recovery blind spike
	1,2,4-trichlorobenzene	R	unacceptable recovery blind spike
	2-chloronaphthalene	R	unacceptable recovery blind spike
	3-nitroaniline	R	unacceptable recovery blind spike
DY168,160,136	phenanthrene	J	<quantitation limit
DY168,136	pyrene	J	<quantitation limit
DY168,160,136	benzo(a)anthracene	J	<quantitation limit
	chrysene	J	<quantitation limit
	benzo(b)fluoranthene	J	<quantitation limit
	benzo(a)pyrene	J	<quantitation limit
DY164,159,170,153	all positives	J	<quantitation limit
DY160	acenaphthene	J	<quantitation limit
DY160,136	anthracene	J	<quantitation limit
	indeno(1,2,3-cd)pyrene	J	<quantitation limit
DY136	benzo(g,h,i)perylene	J	<quantitation limit
DY150	benzoic acid	J	<quantitation limit
DY160	acenaphthene	J	low response factor but present
DY156,159,162,164, 166,168,170,171, 173,174	acenaphthene	R	low response factor
Pesticides			
DY144	alpha-Chlordane	J	<quantitation limit
	gamma-Chlordane	J	<quantitation limit

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51642 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: PB-01

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 0630 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y325

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-05
CASE NO.: 15099 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 1655 STOP: 00/00/00
D. NO.: Y168

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
13U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	7U	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
13U	VINYL ACETATE	7U	STYRENE
7U	BROMODICHLOROMETHANE	7U	TOTAL XYLENES
		25	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51644 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-05 COLLECTION START: 10/17/90 1645 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y169

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51645 SAMPLE TYPE: PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: CITY: PALMETTO ST: FL
STATION ID: SD-04 COLLECTION START: 10/17/90 1630 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y166

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
13U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
13U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		20	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51646 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-04 COLLECTION START: 10/17/90 1620 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y167

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51647 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-08 COLLECTION START: 10/17/90 1605 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y165

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51648 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-08
CASE NO.: 15099 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1610 STOP: 00/00/00
D. NO.: Y164

UG/KG	ANALYTICAL RESULTS
15U	CHLOROMETHANE
15U	BROMOMETHANE
15U	VINYL CHLORIDE
15U	CHLOROETHANE
7U	METHYLENE CHLORIDE
15U	ACETONE
7U	CARBON DISULFIDE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
7U	1,1-DICHLOROETHANE
7U	1,2-DICHLOROETHENE (TOTAL)
7U	CHLOROFORM
7U	1,2-DICHLOROETHANE
15U	METHYL ETHYL KETONE
7U	1,1,1-TRICHLOROETHANE
7U	CARBON TETRACHLORIDE
15U	VINYL ACETATE
7U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
7U	1,2-DICHLOROPROPANE
7U	CIS-1,3-DICHLOROPROPENE
7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
7U	DIBROMOCHLOROMETHANE
7U	1,1,2-TRICHLOROETHANE
7U	BENZENE
7U	TRANS-1,3-DICHLOROPROPENE
7U	BROMOFORM
15U	METHYL ISOBUTYL KETONE
15U	METHYL BUTYL KETONE
7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,1,2,2-TETRACHLOROETHANE
7U	TOLUENE
7U	CHLOROBENZENE
7U	ETHYL BENZENE
7U	STYRENE
7U	TOTAL XYLENES
32	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-11 COLLECTION START: 10/17/90 1505 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y159

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
21U	CHLOROMETHANE	11U	1,2-DICHLOROPROPANE
21U	BROMOMETHANE	11U	CIS-1,3-DICHLOROPROPENE
21U	VINYL CHLORIDE	11U	TRICHLOROETHENE(TRICHLOROETHYLENE)
21U	CHLOROETHANE	11U	DIBROMOCHLOROMETHANE
11U	METHYLENE CHLORIDE	11U	1,1,2-TRICHLOROETHANE
21U	ACETONE	11U	BENZENE
11U	CARBON DISULFIDE	11U	TRANS-1,3-DICHLOROPROPENE
11U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	11U	BROMOFORM
11U	1,1-DICHLOROETHANE	21U	METHYL ISOBUTYL KETONE
11U	1,2-DICHLOROETHENE (TOTAL)	21U	METHYL BUTYL KETONE
11U	CHLOROFORM	11U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
11U	1,2-DICHLOROETHANE	11U	1,1,2,2-TETRACHLOROETHANE
21U	METHYL ETHYL KETONE	11U	TOLUENE
11U	1,1,1-TRICHLOROETHANE	11U	CHLOROBENZENE
11U	CARBON TETRACHLORIDE	11U	ETHYL BENZENE
21U	VINYL ACETATE	11U	STYRENE
11U	BROMODICHLOROMETHANE	11U	TOTAL XYLENES
		53	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y158

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
70U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
30U	ACETONE	5U	BENZENE
4J	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51651 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-09 COLLECTION START: 10/17/90 1515 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y163

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
50U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
50U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-09 COLLECTION START: 10/17/90 1530 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y162

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
17U	CHLOROMETHANE	8U	1,2-DICHLOROPROPANE
17U	BROMOMETHANE	8U	CIS-1,3-DICHLOROPROPENE
17U	VINYL CHLORIDE	8U	TRICHLOROETHENE(TRICHLOROETHYLENE)
17U	CHLOROETHANE	8U	DIBROMOCHLOROMETHANE
9U	METHYLENE CHLORIDE	8U	1,1,2-TRICHLOROETHANE
37	ACETONE	8U	BENZENE
8U	CARBON DISULFIDE	8U	TRANS-1,3-DICHLOROPROPENE
8U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	8U	BROMOFORM
8U	1,1-DICHLOROETHANE	17U	METHYL ISOBUTYL KETONE
8U	1,2-DICHLOROETHENE (TOTAL)	17U	METHYL BUTYL KETONE
8U	CHLOROFORM	8U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
8U	1,2-DICHLOROETHANE	8U	1,1,2,2-TETRACHLOROETHANE
17U	METHYL ETHYL KETONE	8U	TOLUENE
8U	1,1,1-TRICHLOROETHANE	8U	CHLOROBENZENE
8U	CARBON TETRACHLORIDE	8U	ETHYL BENZENE
17U	VINYL ACETATE	8U	STYRENE
8U	BROMODICHLOROMETHANE	8U	TOTAL XYLENES
		40	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51653   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-07   COLLECTION START: 10/17/90 1520   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y160

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
30U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	7U	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
13U	VINYL ACETATE	7U	STYRENE
7U	BROMODICHLOROMETHANE	7U	TOTAL XYLENES
		25	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-025   SAMPLE NO. 51654   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL **
** STATION ID: SW-07   COLLECTION START: 10/17/90 1515   STOP: 00/00/00 **
**
** CASE NO.: 15099   SAS NO.:   D. NO.: Y161 **
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51655 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SD-06	COLLECTION START: 10/17/90 1445 STOP: 00/00/00
CASE NO.: 15099 SAS NO.:	D. NO.: Y156

UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE
12U	BROMOMETHANE
12U	VINYL CHLORIDE
12U	CHLOROETHANE
6U	METHYLENE CHLORIDE
26	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
12U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
12U	VINYL ACETATE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
12U	METHYL ISOBUTYL KETONE
12U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
6U	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
18	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51656 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-06 COLLECTION START: 10/17/90 1440 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y157

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51661 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SB-04
COLLECTION START: 10/18/90 1030 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y174

UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE
12U	BROMOMETHANE
12U	VINYL CHLORIDE
12U	CHLOROETHANE
6U	METHYLENE CHLORIDE
12U	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
12U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
12U	VINYL ACETATE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
12U	METHYL ISOBUTYL KETONE
12U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
6U	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
18	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51662 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-04 COLLECTION START: 10/18/90 1040 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y175

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
40U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-04 COLLECTION START: 10/18/90 1020 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y173

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
10U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
13U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	6J	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
13U	VINYL ACETATE	7U	STYRENE
7U	BROMODICHLOROMETHANE	7U	TOTAL XYLENES
		25	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51664   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: TW-05   COLLECTION START: 10/18/90 0930   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y172

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
70U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51665 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SB-05 COLLECTION START: 10/18/90 0910 STOP: 00/00/00 **
** **
** CASE NO.: 15099 SAS NO.: D. NO.: Y171 **
*** ***

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
20U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		16	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-05 COLLECTION START: 10/18/90 0900 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y170

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
12U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	1J	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		14	PERCENT MOISTURE

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51667 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-07

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1150 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y153

UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE
12U	BROMOMETHANE
12U	VINYL CHLORIDE
12U	CHLOROETHANE
6U	METHYLENE CHLORIDE
12U	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
12U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
12U	VINYL ACETATE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
12U	METHYL ISOBUTYL KETONE
12U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
6U	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
17	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SS-06
COLLECTION START: 10/17/90 1205 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y152

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
13U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	1J	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
13U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		21	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SD-12	COLLECTION START: 10/17/90 1230 STOP: 00/00/00
CASE NO.: 15099 SAS NO.:	D. NO.: Y154

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
15U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
15U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
15U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
15U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
20U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	15U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	15U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
15U	METHYL ETHYL KETONE	7U	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
15U	VINYL ACETATE	7U	STYRENE
7U	BROMODICHLOROMETHANE	7U	TOTAL XYLENES
		33	PERCENT MOISTURE

REMARKS   ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE: PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: CITY: PALMETTO ST: FL
STATION ID: SB-06 COLLECTION START: 10/17/90 1215 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y155

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
12U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	3J	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		16	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PURGEABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51671 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SB-03 COLLECTION START: 10/17/90 1135 STOP: 00/00/00 **
**
** CASE NO.: 15099 SAS NO.: D. NO.: Y149 **
*** ***

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
12U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		19	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51672 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-03 COLLECTION START: 10/17/90 1145 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y151

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51673 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: MW-01

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1130 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y326

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51674 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-01 COLLECTION START: 10/16/90 1330 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y137

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-01 COLLECTION START: 10/16/90 1335 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y136

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
13U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
13U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		21	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00 **
**
** CASE NO.: 15099 SAS NO.: D. NO.: Y329 **

*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
8U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51677   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-02   COLLECTION START: 10/16/90 1415   STOP: 00/00/00
CASE NO.: 15099   SAS NO.:   D. NO.: Y141

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51678   SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-02

PROG ELEM: NSF   COLLECTED BY: M GORDON
CITY: PALMETTO   ST: FL
COLLECTION START: 10/16/90 1420   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y140

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
31U	CHLOROMETHANE	16U	1,2-DICHLOROPROPANE
31U	BROMOMETHANE	16U	CIS-1,3-DICHLOROPROPENE
31U	VINYL CHLORIDE	16U	TRICHLOROETHENE(TRICHLOROETHYLENE)
31U	CHLOROETHANE	16U	DIBROMOCHLOROMETHANE
16U	METHYLENE CHLORIDE	16U	1,1,2-TRICHLOROETHANE
31U	ACETONE	16U	BENZENE
10J	CARBON DISULFIDE	16U	TRANS-1,3-DICHLOROPROPENE
16U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	16U	BROMOFORM
16U	1,1-DICHLOROETHANE	31U	METHYL ISOBUTYL KETONE
16U	1,2-DICHLOROETHENE (TOTAL)	31U	METHYL BUTYL KETONE
16U	CHLOROFORM	16U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
16U	1,2-DICHLOROETHANE	16U	1,1,2,2-TETRACHLOROETHANE
31U	METHYL ETHYL KETONE	16U	TOLUENE
16U	1,1,1-TRICHLOROETHANE	16U	CHLOROBENZENE
16U	CARBON TETRACHLORIDE	16U	ETHYL BENZENE
31U	VINYL ACETATE	16U	STYRENE
16U	BROMODICHLOROMETHANE	16U	TOTAL XYLENES
		68	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51679 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-04 COLLECTION START: 10/16/90 1520 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y327

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
14	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51680   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SS-01   COLLECTION START: 10/16/90 1520   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y138

UG/KG	ANALYTICAL RESULTS
14U	CHLOROMETHANE
14U	BROMOMETHANE
14U	VINYL CHLORIDE
14U	CHLOROETHANE
7U	METHYLENE CHLORIDE
14U	ACETONE
7U	CARBON DISULFIDE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
7U	1,1-DICHLOROETHANE
7U	1,2-DICHLOROETHENE (TOTAL)
7U	CHLOROFORM
7U	1,2-DICHLOROETHANE
14U	METHYL ETHYL KETONE
7U	1,1,1-TRICHLOROETHANE
7U	CARBON TETRACHLORIDE
14U	VINYL ACETATE
7U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
7U	1,2-DICHLOROPROPANE
7U	CIS-1,3-DICHLOROPROPENE
7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
7U	DIBROMOCHLOROMETHANE
7U	1,1,2-TRICHLOROETHANE
7U	BENZENE
7U	TRANS-1,3-DICHLOROPROPENE
7U	BROMOFORM
14U	METHYL ISOBUTYL KETONE
14U	METHYL BUTYL KETONE
7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,1,2,2-TETRACHLOROETHANE
2J	TOLUENE
7U	CHLOROBENZENE
7U	ETHYL BENZENE
7U	STYRENE
7U	TOTAL XYLENES
26	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51681 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-01 COLLECTION START: 10/16/90 1535 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y139

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
12U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		18	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51682   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: MW-06   COLLECTION START: 10/16/90 1615   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y143

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
50U	ACETONE	5U	BENZENE
130	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES

*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

PURGEABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51683 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: TW-01 COLLECTION START: 10/16/90 1625 STOP: 00/00/00 **
**
** CASE NO.: 15099 SAS NO.: D. NO.: Y142 **
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51684 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PW-01 COLLECTION START: 10/17/90 0935 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y147

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51685 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-02 COLLECTION START: 10/17/90 0925 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y144

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
11U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
11U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
11U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
11U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
11U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	11U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	11U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
11U	METHYL ETHYL KETONE	2J	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
11U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES
		8	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51686 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SB-02
COLLECTION START: 10/17/90 0945 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y145

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
12U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
12U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		16	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-03 COLLECTION START: 10/17/90 0900 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y328

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
5U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10UR	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-10
COLLECTION START: 10/17/90 1045 STOP: 00/00/00
CASE NO.: 15099 SAS NO.: D. NO.: Y150

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
19U	CHLOROMETHANE	9U	1,2-DICHLOROPROPANE
19U	BROMOMETHANE	9U	CIS-1,3-DICHLOROPROPENE
19U	VINYL CHLORIDE	9U	TRICHLOROETHENE(TRICHLOROETHYLENE)
19U	CHLOROETHANE	9U	DIBROMOCHLOROMETHANE
9U	METHYLENE CHLORIDE	9U	1,1,2-TRICHLOROETHANE
30U	ACETONE	9U	BENZENE
9U	CARBON DISULFIDE	9U	TRANS-1,3-DICHLOROPROPENE
9U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	9U	BROMOFORM
9U	1,1-DICHLOROETHANE	19U	METHYL ISOBUTYL KETONE
9U	1,2-DICHLOROETHENE (TOTAL)	19U	METHYL BUTYL KETONE
9U	CHLOROFORM	9U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
9U	1,2-DICHLOROETHANE	9U	1,1,2,2-TETRACHLOROETHANE
19U	METHYL ETHYL KETONE	9U	TOLUENE
9U	1,1,1-TRICHLOROETHANE	9U	CHLOROBENZENE
9U	CARBON TETRACHLORIDE	9U	ETHYL BENZENE
19U	VINYL ACETATE	9U	STYRENE
9U	BROMODICHLOROMETHANE	9U	TOTAL XYLENES
		47	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51689 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-03 COLLECTION START: 10/17/90 1020 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y148

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
13U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	13U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	13U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
13U	VINYL ACETATE	6U	STYRENE
6U	BROMODICHLOROMETHANE	6U	TOTAL XYLENES
		20	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51690 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-02 COLLECTION START: 10/17/90 1040 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y146

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
10U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51691 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TB-01S COLLECTION START: 10/12/90 0700 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y324

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
11U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
11U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
11U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
11U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
20U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
39	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	11U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	11U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
11U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
11U	VINYL ACETATE	5U	STYRENE
5U	BROMODICHLOROMETHANE	5U	TOTAL XYLENES
		7	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51642  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO             ST: FL                    **
**   STATION ID: PB-01                                               COLLECTION START: 10/15/90  0630   STOP: 00/00/00    **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y325               MD NO: Y325               **
**                                                                                                                        **
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ANALYTICAL RESULTS UG/L

6JN   ACETALDEHYDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51650  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                **
**   STATION ID: SW-11                                                COLLECTION START: 10/17/90  1445   STOP: 00/00/00 **
**   CASE.NO.: 15099         SAS NO.:                                 D. NO.: Y158                MD NO: Y158           **
**                                                                                                                      **
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ANALYTICAL RESULTS UG/L

8JN TETRAMETHYLBUTANE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-07 COLLECTION START: 10/17/90 1520 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y160 MD NO: Y160 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

20J	1 UNIDENTIFIED COMPOUND
30JN	TRIMETHYLBICYCLOHEPTANE
200JN	METHYL(METHYLETHYL)BENZENE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51664  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON        **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO             ST: FL              **
**   STATION ID: TW-05                                                COLLECTION START: 10/18/90  0930   STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y172               MD NO: Y172         **
**                                                                                                                   **
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ANALYTICAL RESULTS UG/L

7JN TETRAMETHYLBUTANE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

SISB/SAS
RECEIVED
JAN 22 1991
EPA - REGION IV
ATLANTA GA

*****MEMORANDUM******

DATE: 01/05/91

SUBJECT: Results of Extractable Organic Analysis;
91-025 AMAX PHOSPHATE FACIL
PALMETTO FL
CASE NO: 15099

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

ORGANIC DATA QUALIFIER REPORT

Case Number 15099 Project Number 91-025 SAS Number

Site ID. Amax Phosphate Facil, Palmetto, FL.

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
DY143,157,158,161, 163,165,167,169, 172,175,327-329	2-butanone	R	low response factor
DY158	carbon disulfide	J	<quantitation limit
Extractables			
all samples	di-n-butylphthalate	J	low QC spike recovery
	benzo(a)anthracene	J	low QC spike recovery
DY146	all positives	J	<quantitation limit
Pesticides			
none			

ORGANIC DATA QUALIFIER REPORT

Case Number 15099 Project Number 91-025 SAS Number

Site ID. Amax Phosphate Facil, Palmetto, FL.

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
DY173,170,152,155, 140,138,144	all positives	J	<quantitation limit
Extractables			
all samples	bis(2-chloroisopropyl)ether	R	unacceptable recovery blind spike
	nitrobenzene	R	unacceptable recovery blind spike
	1,2,4-trichlorobenzene	R	unacceptable recovery blind spike
	2-chloronaphthalene	R	unacceptable recovery blind spike
	3-nitroaniline	R	unacceptable recovery blind spike
DY168,160,136	phenanthrene	J	<quantitation limit
DY168,136	pyrene	J	<quantitation limit
DY168,160,136	benzo(a)anthracene	J	<quantitation limit
	chrysene	J	<quantitation limit
	benzo(b)fluoranthene	J	<quantitation limit
	benzo(a)pyrene	J	<quantitation limit
DY164,159,170,153	all positives	J	<quantitation limit
DY160	acenaphthene	J	<quantitation limit
DY160,136	anthracene	J	<quantitation limit
	indeno(1,2,3-cd)pyrene	J	<quantitation limit
DY136	benzo(g,h,i)perylene	J	<quantitation limit
DY150	benzoic acid	J	<quantitation limit
DY160	acenaphthene	J	low response factor but present
DY156,159,162,164, 166,168,170,171, 173,174	acenaphthene	R	low response factor
Pesticides			
DY144	alpha-Chlordane	J	<quantitation limit
	gamma-Chlordane	J	<quantitation limit

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51642 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: PB-01

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 0630 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y325

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-05

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 1655 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y168

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
880U	PHENOL	4300UR	3-NITROANILINE
880U	BIS(2-CHLOROETHYL) ETHER	880UR	ACENAPHTHENE
880U	2-CHLOROPHENOL	4300U	2,4-DINITROPHENOL
880U	1,3-DICHLOROBENZENE	4300U	4-NITROPHENOL
880U	1,4-DICHLOROBENZENE	880U	DIBENZOFURAN
880U	BENZYL ALCOHOL	880U	2,4-DINITROTOLUENE
880U	1,2-DICHLOROBENZENE	880U	DIETHYL PHTHALATE
880U	2-METHYLPHENOL	880U	4-CHLOROPHENYL PHENYL ETHER
880UR	BIS(2-CHLOROISOPROPYL) ETHER	880U	FLUORENE
880U	(3-AND/OR 4-)METHYLPHENOL	4300U	4-NITROANILINE
880U	N-NITROSODI-N-PROPYLAMINE	4300U	2-METHYL-4,6-DINITROPHENOL
880U	HEXACHLOROETHANE	880U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
880UR	NITROBENZENE	880U	4-BROMOPHENYL PHENYL ETHER
880U	ISOPHORONE	880U	HEXACHLOROBENZENE (HCB)
880U	2-NITROPHENOL	4300U	PENTACHLOROPHENOL
880U	2,4-DIMETHYLPHENOL	750J	PHENANTHRENE
4300U	BENZOIC ACID	880U	ANTHRACENE
880U	BIS(2-CHLOROETHOXY) METHANE	880U	DI-N-BUTYLPHTHALATE
880U	2,4-DICHLOROPHENOL	1300	FLUORANTHENE
880UR	1,2,4-TRICHLOROBENZENE	720J	PYRENE
880U	NAPHTHALENE	880U	BENZYL BUTYL PHTHALATE
880U	4-CHLOROANILINE	1800U	3,3'-DICHLOROBENZIDINE
880U	HEXACHLOROBUTADIENE	120J	BENZO(A)ANTHRACENE
880U	4-CHLORO-3-METHYLPHENOL	420J	CHRYSENE
880U	2-METHYLNAPHTHALENE	880U	BIS(2-ETHYLHEXYL) PHTHALATE
880U	HEXACHLOROCYCLOPENTADIENE (HCCP)	880U	DI-N-OCTYLPHTHALATE
880U	2,4,6-TRICHLOROPHENOL	270J	BENZO(B AND/OR K)FLUORANTHENE
4300U	2,4,5-TRICHLOROPHENOL	210J	BENZO-A-PYRENE
880UR	2-CHLORONAPHTHALENE	880U	INDENO (1,2,3-CD) PYRENE
4300U	2-NITROANILINE	880U	DIBENZO(A,H)ANTHRACENE
880U	DIMETHYL PHTHALATE	880U	BENZO(GHI)PERYLENE
880U	ACENAPHTHYLENE	25	PERCENT MOISTURE
880U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51644 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-05 COLLECTION START: 10/17/90 1645 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y169

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51645 SAMPLE TYPE: PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: CITY: PALMETTO ST: FL
STATION ID: SD-04 COLLECTION START: 10/17/90 1630 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y166

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
810U	PHENOL	4000UR	3-NITROANILINE
810U	BIS(2-CHLOROETHYL) ETHER	810UR	ACENAPHTHENE
810U	2-CHLOROPHENOL	4000U	2,4-DINITROPHENOL
810U	1,3-DICHLOROBENZENE	4000U	4-NITROPHENOL
810U	1,4-DICHLOROBENZENE	810U	DIBENZOFURAN
810U	BENZYL ALCOHOL	810U	2,4-DINITROTOLUENE
810U	1,2-DICHLOROBENZENE	810U	DIETHYL PHTHALATE
810U	2-METHYLPHENOL	810U	4-CHLOROPHENYL PHENYL ETHER
810UR	BIS(2-CHLOROISOPROPYL) ETHER	810U	FLUORENE
810U	(3-AND/OR 4-)METHYLPHENOL	4000U	4-NITROANILINE
810U	N-NITROSODI-N-PROPYLAMINE	4000U	2-METHYL-4,6-DINITROPHENOL
810U	HEXACHLOROETHANE	810U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
810UR	NITROBENZENE	810U	4-BROMOPHENYL PHENYL ETHER
810U	ISOPHORONE	810U	HEXACHLOROBENZENE (HCB)
810U	2-NITROPHENOL	4000U	PENTACHLOROPHENOL
810U	2,4-DIMETHYLPHENOL	810U	PHENANTHRENE
4000U	BENZOIC ACID	810U	ANTHRACENE
810U	BIS(2-CHLOROETHOXY) METHANE	810U	DI-N-BUTYLPHTHALATE
810U	2,4-DICHLOROPHENOL	810U	FLUORANTHENE
810UR	1,2,4-TRICHLOROBENZENE	810U	PYRENE
810U	NAPHTHALENE	810U	BENZYL BUTYL PHTHALATE
810U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
810U	HEXACHLOROBUTADIENE	810U	BENZO(A)ANTHRACENE
810U	4-CHLORO-3-METHYLPHENOL	810U	CHRYSENE
810U	2-METHYLNAPHTHALENE	810U	BIS(2-ETHYLHEXYL) PHTHALATE
810U	HEXACHLOROCYCLOPENTADIENE (HCCP)	810U	DI-N-OCTYLPHTHALATE
810U	2,4,6-TRICHLOROPHENOL	810U	BENZO(B AND/OR K)FLUORANTHENE
4000U	2,4,5-TRICHLOROPHENOL	810U	BENZO-A-PYRENE
810UR	2-CHLORONAPHTHALENE	810U	INDENO (1,2,3-CD) PYRENE
4000U	2-NITROANILINE	810U	DIBENZO(A,H)ANTHRACENE
810U	DIMETHYL PHTHALATE	810U	BENZO(GHI)PERYLENE
810U	ACENAPHTHYLENE	19	PERCENT MOISTURE
810U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51646 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-04 COLLECTION START: 10/17/90 1620 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y167

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51647 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-08 COLLECTION START: 10/17/90 1605 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y165

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE

UG/L	ANALYTICAL RESULTS
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4-BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51648   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-08   COLLECTION START: 10/17/90 1610   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y164

UG/KG	ANALYTICAL RESULTS
970U	PHENOL
970U	BIS(2-CHLOROETHYL) ETHER
970U	2-CHLOROPHENOL
970U	1,3-DICHLOROBENZENE
970U	1,4-DICHLOROBENZENE
970U	BENZYL ALCOHOL
970U	1,2-DICHLOROBENZENE
970U	2-METHYLPHENOL
970UR	BIS(2-CHLOROISOPROPYL) ETHER
970U	(3-AND/OR 4-)METHYLPHENOL
970U	N-NITROSODI-N-PROPYLAMINE
970U	HEXACHLOROETHANE
970UR	NITROBENZENE
970U	ISOPHORONE
970U	2-NITROPHENOL
970U	2,4-DIMETHYLPHENOL
4700U	BENZOIC ACID
970U	BIS(2-CHLOROETHOXY) METHANE
970U	2,4-DICHLOROPHENOL
970UR	1,2,4-TRICHLOROBENZENE
970U	NAPHTHALENE
970U	4-CHLOROANILINE
970U	HEXACHLOROBUTADIENE
970U	4-CHLORO-3-METHYLPHENOL
970U	2-METHYLNAPHTHALENE
970U	HEXACHLOROCYCLOPENTADIENE (HCCP)
970U	2,4,6-TRICHLOROPHENOL
4700U	2,4,5-TRICHLOROPHENOL
970UR	2-CHLORONAPHTHALENE
4700U	2-NITROANILINE
970U	DIMETHYL PHTHALATE
970U	ACENAPHTHYLENE
970U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
4700UR	3-NITROANILINE
970UR	ACENAPHTHENE
4700U	2,4-DINITROPHENOL
4700U	4-NITROPHENOL
970U	DIBENZOFURAN
970U	2,4-DINITROTOLUENE
970U	DIETHYL PHTHALATE
970U	4-CHLOROPHENYL PHENYL ETHER
970U	FLUORENE
4700U	4-NITROANILINE
4700U	2-METHYL-4,6-DINITROPHENOL
970U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
970U	4-BROMOPHENYL PHENYL ETHER
970U	HEXACHLOROBENZENE (HCB)
4700U	PENTACHLOROPHENOL
970U	PHENANTHRENE
970U	ANTHRACENE
970U	DI-N-BUTYLPHTHALATE
970U	FLUORANTHENE
970U	PYRENE
210J	BENZYL BUTYL PHTHALATE
1900U	3,3'-DICHLOROBENZIDINE
970U	BENZO(A)ANTHRACENE
970U	CHRYSENE
970U	BIS(2-ETHYLHEXYL) PHTHALATE
970U	DI-N-OCTYLPHTHALATE
970U	BENZO(B AND/OR K)FLUORANTHENE
970U	BENZO-A-PYRENE
970U	INDENO (1,2,3-CD) PYRENE
970U	DIBENZO(A,H)ANTHRACENE
970U	BENZO(GHI)PERYLENE
32	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-11 COLLECTION START: 10/17/90 1505 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y159

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
1400U	PHENOL	6700UR	3-NITROANILINE
1400U	BIS(2-CHLOROETHYL) ETHER	1400UR	ACENAPHTHENE
1400U	2-CHLOROPHENOL	6700U	2,4-DINITROPHENOL
1400U	1,3-DICHLOROBENZENE	6700U	4-NITROPHENOL
1400U	1,4-DICHLOROBENZENE	1400U	DIBENZOFURAN
1400U	BENZYL ALCOHOL	1400U	2,4-DINITROTOLUENE
1400U	1,2-DICHLOROBENZENE	1400U	DIETHYL PHTHALATE
1400U	2-METHYLPHENOL	1400U	4-CHLOROPHENYL PHENYL ETHER
1400UR	BIS(2-CHLOROISOPROPYL) ETHER	1400U	FLUORENE
1400U	(3-AND/OR 4-)METHYLPHENOL	6700U	4-NITROANILINE
1400U	N-NITROSODI-N-PROPYLAMINE	6700U	2-METHYL-4,6-DINITROPHENOL
1400U	HEXACHLOROETHANE	1400U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
1400UR	NITROBENZENE	1400U	4-BROMOPHENYL PHENYL ETHER
1400U	ISOPHORONE	1400U	HEXACHLOROBENZENE (HCB)
1400U	2-NITROPHENOL	6700U	PENTACHLOROPHENOL
1400U	2,4-DIMETHYLPHENOL	1400U	PHENANTHRENE
6700U	BENZOIC ACID	1400U	ANTHRACENE
1400U	BIS(2-CHLOROETHOXY) METHANE	150J	DI-N-BUTYLPHTHALATE
1400U	2,4-DICHLOROPHENOL	1400U	FLUORANTHENE
1400UR	1,2,4-TRICHLOROBENZENE	1400U	PYRENE
1400U	NAPHTHALENE	1400U	BENZYL BUTYL PHTHALATE
1400U	4-CHLOROANILINE	2800U	3,3'-DICHLOROBENZIDINE
1400U	HEXACHLOROBUTADIENE	1400U	BENZO(A)ANTHRACENE
1400U	4-CHLORO-3-METHYLPHENOL	1400U	CHRYSENE
1400U	2-METHYLNAPHTHALENE	1400U	BIS(2-ETHYLHEXYL) PHTHALATE
1400U	HEXACHLOROCYCLOPENTADIENE (HCCP)	1400U	DI-N-OCTYLPHTHALATE
1400U	2,4,6-TRICHLOROPHENOL	1400U	BENZO(B AND/OR K)FLUORANTHENE
6700U	2,4,5-TRICHLOROPHENOL	1400U	BENZO-A-PYRENE
1400UR	2-CHLORONAPHTHALENE	1400U	INDENO (1,2,3-CD) PYRENE
6700U	2-NITROANILINE	1400U	DIBENZO(A,H)ANTHRACENE
1400U	DIMETHYL PHTHALATE	1400U	BENZO(GHI)PERYLENE
1400U	ACENAPHTHYLENE	52	PERCENT MOISTURE
1400U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y158

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51651 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-09 COLLECTION START: 10/17/90 1515 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y163

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-09 COLLECTION START: 10/17/90 1530 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y162

UG/KG	ANALYTICAL RESULTS
1100U	PHENOL
1100U	BIS(2-CHLOROETHYL) ETHER
1100U	2-CHLOROPHENOL
1100U	1,3-DICHLOROBENZENE
1100U	1,4-DICHLOROBENZENE
1100U	BENZYL ALCOHOL
1100U	1,2-DICHLOROBENZENE
1100U	2-METHYLPHENOL
1100UR	BIS(2-CHLOROISOPROPYL) ETHER
1100U	(3-AND/OR 4-)METHYLPHENOL
1100U	N-NITROSODI-N-PROPYLAMINE
1100U	HEXACHLOROETHANE
1100UR	NITROBENZENE
1100U	ISOPHORONE
1100U	2-NITROPHENOL
1100U	2,4-DIMETHYLPHENOL
5300U	BENZOIC ACID
1100U	BIS(2-CHLOROETHOXY) METHANE
1100U	2,4-DICHLOROPHENOL
1100UR	1,2,4-TRICHLOROBENZENE
1100U	NAPHTHALENE
1100U	4-CHLOROANILINE
1100U	HEXACHLOROBUTADIENE
1100U	4-CHLORO-3-METHYLPHENOL
1100U	2-METHYLNAPHTHALENE
1100U	HEXACHLOROCYCLOPENTADIENE (HCCP)
1100U	2,4,6-TRICHLOROPHENOL
5300U	2,4,5-TRICHLOROPHENOL
1100UR	2-CHLORONAPHTHALENE
5300U	2-NITROANILINE
1100U	DIMETHYL PHTHALATE
1100U	ACENAPHTHYLENE
1100U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
5300UR	3-NITROANILINE
110UR	ACENAPHTHENE
5300U	2,4-DINITROPHENOL
5300U	4-NITROPHENOL
1100U	DIBENZOFURAN
1100U	2,4-DINITROTOLUENE
1100U	DIETHYL PHTHALATE
1100U	4-CHLOROPHENYL PHENYL ETHER
1100U	FLUORENE
5300U	4-NITROANILINE
5300U	2-METHYL-4,6-DINITROPHENOL
1100U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
1100U	4-BROMOPHENYL PHENYL ETHER
1100U	HEXACHLOROBENZENE (HCB)
5300U	PENTACHLOROPHENOL
1100U	PHENANTHRENE
1100U	ANTHRACENE
1100U	DI-N-BUTYLPHTHALATE
1100U	FLUORANTHENE
1100U	PYRENE
1100U	BENZYL BUTYL PHTHALATE
2200U	3,3'-DICHLOROBENZIDINE
1100U	BENZO(A)ANTHRACENE
1100U	CHRYSENE
1100U	BIS(2-ETHYLHEXYL) PHTHALATE
1100U	DI-N-OCTYLPHTHALATE
1100U	BENZO(B AND/OR K)FLUORANTHENE
1100U	BENZO-A-PYRENE
1100U	INDENO (1,2,3-CD) PYRENE
1100U	DIBENZO(A,H)ANTHRACENE
1100U	BENZO(GHI)PERYLENE
40	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-07 COLLECTION START: 10/17/90 1520 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y160

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
880U	PHENOL	4300UR	3-NITROANILINE
880U	BIS(2-CHLOROETHYL) ETHER	140J	ACENAPHTHENE
880U	2-CHLOROPHENOL	4300U	2,4-DINITROPHENOL
880U	1,3-DICHLOROBENZENE	4300U	4-NITROPHENOL
880U	1,4-DICHLOROBENZENE	880U	DIBENZOFURAN
880U	BENZYL ALCOHOL	880U	2,4-DINITROTOLUENE
880U	1,2-DICHLOROBENZENE	880U	DIETHYL PHTHALATE
880U	2-METHYLPHENOL	880U	4-CHLOROPHENYL PHENYL ETHER
880UR	BIS(2-CHLOROISOPROPYL) ETHER	880U	FLUORENE
880U	(3-AND/OR 4-)METHYLPHENOL	4300U	4-NITROANILINE
880U	N-NITROSODI-N-PROPYLAMINE	4300U	2-METHYL-4,6-DINITROPHENOL
880U	HEXACHLOROETHANE	880U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
880UR	NITROBENZENE	880U	4-BROMOPHENYL PHENYL ETHER
880U	ISOPHORONE	880U	HEXACHLOROBENZENE (HCB)
880U	2-NITROPHENOL	4300U	PENTACHLOROPHENOL
880U	2,4-DIMETHYLPHENOL	760J	PHENANTHRENE
4300U	BENZOIC ACID	190J	ANTHRACENE
880U	BIS(2-CHLOROETHOXY) METHANE	880U	DI-N-BUTYLPHTHALATE
880U	2,4-DICHLOROPHENOL	3200	FLUORANTHENE
880UR	1,2,4-TRICHLOROBENZENE	1600	PYRENE
880U	NAPHTHALENE	880U	BENZYL BUTYL PHTHALATE
880U	4-CHLOROANILINE	1800U	3,3'-DICHLOROBENZIDINE
880U	HEXACHLOROBUTADIENE	490J	BENZO(A)ANTHRACENE
880U	4-CHLORO-3-METHYLPHENOL	710J	CHRYSENE
880U	2-METHYLNAPHTHALENE	880U	BIS(2-ETHYLHEXYL) PHTHALATE
880U	HEXACHLOROCYCLOPENTADIENE (HCCP)	880U	DI-N-OCTYLPHTHALATE
880U	2,4,6-TRICHLOROPHENOL	470J	BENZO(B AND/OR K)FLUORANTHENE
4300U	2,4,5-TRICHLOROPHENOL	350J	BENZO-A-PYRENE
880UR	2-CHLORONAPHTHALENE	140J	INDENO (1,2,3-CD) PYRENE
4300U	2-NITROANILINE	880U	DIBENZO(A,H)ANTHRACENE
880U	DIMETHYL PHTHALATE	880U	BENZO(GHI)PERYLENE
880U	ACENAPHTHYLENE	25	PERCENT MOISTURE
880U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51654 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-07 COLLECTION START: 10/17/90 1515 STOP: 00/00/00 **
** **
** CASE NO.: 15099 SAS NO.: D. NO.: Y161 **
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51655 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-06 COLLECTION START: 10/17/90 1445 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y156

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
800U	PHENOL	3900UR	3-NITROANILINE
800U	BIS(2-CHLOROETHYL) ETHER	800UR	ACENAPHTHENE
800U	2-CHLOROPHENOL	3900U	2,4-DINITROPHENOL
800U	1,3-DICHLOROBENZENE	3900U	4-NITROPHENOL
800U	1,4-DICHLOROBENZENE	800U	DIBENZOFURAN
800U	BENZYL ALCOHOL	800U	2,4-DINITROTOLUENE
800U	1,2-DICHLOROBENZENE	800U	DIETHYL PHTHALATE
800U	2-METHYLPHENOL	800U	4-CHLOROPHENYL PHENYL ETHER
800UR	BIS(2-CHLOROISOPROPYL) ETHER	800U	FLUORENE
800U	(3-AND/OR 4-)METHYLPHENOL	3900U	4-NITROANILINE
800U	N-NITROSODI-N-PROPYLAMINE	3900U	2-METHYL-4,6-DINITROPHENOL
800U	HEXACHLOROETHANE	800U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
800UR	NITROBENZENE	800U	4-BROMOPHENYL PHENYL ETHER
800U	ISOPHORONE	800U	HEXACHLOROBENZENE (HCB)
800U	2-NITROPHENOL	3900U	PENTACHLOROPHENOL
800U	2,4-DIMETHYLPHENOL	800U	PHENANTHRENE
3900U	BENZOIC ACID	800U	ANTHRACENE
800U	BIS(2-CHLOROETHOXY) METHANE	800U	DI-N-BUTYLPHTHALATE
800U	2,4-DICHLOROPHENOL	800U	FLUORANTHENE
800UR	1,2,4-TRICHLOROBENZENE	800U	PYRENE
800U	NAPHTHALENE	800U	BENZYL BUTYL PHTHALATE
800U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
800U	HEXACHLOROBUTADIENE	800U	BENZO(A)ANTHRACENE
800U	4-CHLORO-3-METHYLPHENOL	800U	CHRYSENE
800U	2-METHYLNAPHTHALENE	800U	BIS(2-ETHYLHEXYL) PHTHALATE
800U	HEXACHLOROCYCLOPENTADIENE (HCCP)	800U	DI-N-OCTYLPHTHALATE
800U	2,4,6-TRICHLOROPHENOL	800U	BENZO(B AND/OR K)FLUORANTHENE
3900U	2,4,5-TRICHLOROPHENOL	800U	BENZO-A-PYRENE
800UR	2-CHLORONAPHTHALENE	800U	INDENO (1,2,3-CD) PYRENE
3900U	2-NITROANILINE	800U	DIBENZO(A,H)ANTHRACENE
800U	DIMETHYL PHTHALATE	800U	BENZO(GHI)PERYLENE
800U	ACENAPHTHYLENE	18	PERCENT MOISTURE
800U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51656   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-06   COLLECTION START: 10/17/90 1440   STOP: 00/00/00

CASE NO.: 15099   SAS NO.:   D. NO.: Y157

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	40U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51661 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-04

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 1030 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y174

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
800U	PHENOL	3900UR	3-NITROANILINE
800U	BIS(2-CHLOROETHYL) ETHER	800UR	ACENAPHTHENE
800U	2-CHLOROPHENOL	3900U	2,4-DINITROPHENOL
800U	1,3-DICHLOROBENZENE	3900U	4-NITROPHENOL
800U	1,4-DICHLOROBENZENE	800U	DIBENZOFURAN
800U	BENZYL ALCOHOL	800U	2,4-DINITROTOLUENE
800U	1,2-DICHLOROBENZENE	800U	DIETHYL PHTHALATE
800U	2-METHYLPHENOL	800U	4-CHLOROPHENYL PHENYL ETHER
800UR	BIS(2-CHLOROISOPROPYL) ETHER	800U	FLUORENE
800U	(3-AND/OR 4-)METHYLPHENOL	3900U	4-NITROANILINE
800U	N-NITROSODI-N-PROPYLAMINE	3900U	2-METHYL-4,6-DINITROPHENOL
800U	HEXACHLOROETHANE	800U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
800UR	NITROBENZENE	800U	4-BROMOPHENYL PHENYL ETHER
800U	ISOPHORONE	800U	HEXACHLOROBENZENE (HCB)
800U	2-NITROPHENOL	3900U	PENTACHLOROPHENOL
800U	2,4-DIMETHYLPHENOL	800U	PHENANTHRENE
3900U	BENZOIC ACID	800U	ANTHRACENE
800U	BIS(2-CHLOROETHOXY) METHANE	800U	DI-N-BUTYLPHTHALATE
800U	2,4-DICHLOROPHENOL	800U	FLUORANTHENE
800UR	1,2,4-TRICHLOROBENZENE	800U	PYRENE
800U	NAPHTHALENE	800U	BENZYL BUTYL PHTHALATE
800U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
800U	HEXACHLOROBUTADIENE	800U	BENZO(A)ANTHRACENE
800U	4-CHLORO-3-METHYLPHENOL	800U	CHRYSENE
800U	2-METHYLNAPHTHALENE	800U	BIS(2-ETHYLHEXYL) PHTHALATE
800U	HEXACHLOROCYCLOPENTADIENE (HCCP)	800U	DI-N-OCTYLPHTHALATE
800U	2,4,6-TRICHLOROPHENOL	800U	BENZO(B AND/OR K)FLUORANTHENE
3900U	2,4,5-TRICHLOROPHENOL	800U	BENZO-A-PYRENE
800UR	2-CHLORONAPHTHALENE	800U	INDENO (1,2,3-CD) PYRENE
3900U	2-NITROANILINE	800U	DIBENZO(A,H)ANTHRACENE
800U	DIMETHYL PHTHALATE	800U	BENZO(GHI)PERYLENE
800U	ACENAPHTHYLENE	18	PERCENT MOISTURE
800U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51662 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-04 COLLECTION START: 10/18/90 1040 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y175

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
20U	PHENOL	100U	3-NITROANILINE
20U	BIS(2-CHLOROETHYL) ETHER	20U	ACENAPHTHENE
20U	2-CHLOROPHENOL	100U	2,4-DINITROPHENOL
20U	1,3-DICHLOROBENZENE	100U	4-NITROPHENOL
20U	1,4-DICHLOROBENZENE	20U	DIBENZOFURAN
20U	BENZYL ALCOHOL	20U	2,4-DINITROTOLUENE
20U	1,2-DICHLOROBENZENE	20U	DIETHYL PHTHALATE
20U	2-METHYLPHENOL	20U	4-CHLOROPHENYL PHENYL ETHER
20U	BIS(2-CHLOROISOPROPYL) ETHER	20U	FLUORENE
20U	(3-AND/OR 4-)METHYLPHENOL	100U	4-NITROANILINE
20U	N-NITROSODI-N-PROPYLAMINE	100U	2-METHYL-4,6-DINITROPHENOL
20U	HEXACHLOROETHANE	20U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
20U	NITROBENZENE	20U	4-BROMOPHENYL PHENYL ETHER
20U	ISOPHORONE	20U	HEXACHLOROBENZENE (HCB)
20U	2-NITROPHENOL	100U	PENTACHLOROPHENOL
20U	2,4-DIMETHYLPHENOL	20U	PHENANTHRENE
100U	BENZOIC ACID	20U	ANTHRACENE
20U	BIS(2-CHLOROETHOXY) METHANE	20UJ	DI-N-BUTYLPHTHALATE
20U	2,4-DICHLOROPHENOL	20U	FLUORANTHENE
20U	1,2,4-TRICHLOROBENZENE	20U	PYRENE
20U	NAPHTHALENE	20U	BENZYL BUTYL PHTHALATE
20U	4-CHLOROANILINE	40U	3,3'-DICHLOROBENZIDINE
20U	HEXACHLOROBUTADIENE	20UJ	BENZO(A)ANTHRACENE
20U	4-CHLORO-3-METHYLPHENOL	20U	CHRYSENE
20U	2-METHYLNAPHTHALENE	20U	BIS(2-ETHYLHEXYL) PHTHALATE
20U	HEXACHLOROCYCLOPENTADIENE (HCCP)	20U	DI-N-OCTYLPHTHALATE
20U	2,4,6-TRICHLOROPHENOL	20U	BENZO(B AND/OR K)FLUORANTHENE
100U	2,4,5-TRICHLOROPHENOL	20U	BENZO-A-PYRENE
20U	2-CHLORONAPHTHALENE	20U	INDENO (1,2,3-CD) PYRENE
100U	2-NITROANILINE	20U	DIBENZO(A,H)ANTHRACENE
20U	DIMETHYL PHTHALATE	20U	BENZO(GHI)PERYLENE
20U	ACENAPHTHYLENE		
20U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-04 COLLECTION START: 10/18/90 1020 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y173

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
880U	PHENOL	4300UR	3-NITROANILINE
880U	BIS(2-CHLOROETHYL) ETHER	880UR	ACENAPHTHENE
880U	2-CHLOROPHENOL	4300U	2,4-DINITROPHENOL
880U	1,3-DICHLOROBENZENE	4300U	4-NITROPHENOL
880U	1,4-DICHLOROBENZENE	880U	DIBENZOFURAN
880U	BENZYL ALCOHOL	880U	2,4-DINITROTOLUENE
880U	1,2-DICHLOROBENZENE	880U	DIETHYL PHTHALATE
880U	2-METHYLPHENOL	880U	4-CHLOROPHENYL PHENYL ETHER
880UR	BIS(2-CHLOROISOPROPYL) ETHER	880U	FLUORENE
880U	(3-AND/OR 4-)METHYLPHENOL	4300U	4-NITROANILINE
880U	N-NITROSODI-N-PROPYLAMINE	4300U	2-METHYL-4,6-DINITROPHENOL
880U	HEXACHLOROETHANE	880U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
880UR	NITROBENZENE	880U	4-BROMOPHENYL PHENYL ETHER
880U	ISOPHORONE	880U	HEXACHLOROBENZENE (HCB)
880U	2-NITROPHENOL	4300U	PENTACHLOROPHENOL
880U	2,4-DIMETHYLPHENOL	880U	PHENANTHRENE
4300U	BENZOIC ACID	880U	ANTHRACENE
880U	BIS(2-CHLOROETHOXY) METHANE	880U	DI-N-BUTYLPHTHALATE
880U	2,4-DICHLOROPHENOL	880U	FLUORANTHENE
880UR	1,2,4-TRICHLOROBENZENE	880U	PYRENE
880U	NAPHTHALENE	880U	BENZYL BUTYL PHTHALATE
880U	4-CHLOROANILINE	1800U	3,3'-DICHLOROBENZIDINE
880U	HEXACHLOROBUTADIENE	880U	BENZO(A)ANTHRACENE
880U	4-CHLORO-3-METHYLPHENOL	880U	CHRYSENE
880U	2-METHYLNAPHTHALENE	880U	BIS(2-ETHYLHEXYL) PHTHALATE
880U	HEXACHLOROCYCLOPENTADIENE (HCCP)	880U	DI-N-OCTYLPHTHALATE
880U	2,4,6-TRICHLOROPHENOL	880U	BENZO(B AND/OR K)FLUORANTHENE
4300U	2,4,5-TRICHLOROPHENOL	880U	BENZO-A-PYRENE
880UR	2-CHLORONAPHTHALENE	880U	INDENO (1,2,3-CD) PYRENE
4300U	2-NITROANILINE	880U	DIBENZO(A,H)ANTHRACENE
880U	DIMETHYL PHTHALATE	880U	BENZO(GHI)PERYLENE
880U	ACENAPHTHYLENE	25	PERCENT MOISTURE
880U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51664 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: TW-05

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 0930 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y172

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51665 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-05

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 0910 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y171

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
790U	PHENOL	3800UR	3-NITROANILINE
790U	BIS(2-CHLOROETHYL) ETHER	790UR	ACENAPHTHENE
790U	2-CHLOROPHENOL	3800U	2,4-DINITROPHENOL
790U	1,3-DICHLOROBENZENE	3800U	4-NITROPHENOL
790U	1,4-DICHLOROBENZENE	790U	DIBENZOFURAN
790U	BENZYL ALCOHOL	790U	2,4-DINITROTOLUENE
790U	1,2-DICHLOROBENZENE	790U	DIETHYL PHTHALATE
790U	2-METHYLPHENOL	790U	4-CHLOROPHENYL PHENYL ETHER
790UR	BIS(2-CHLOROISOPROPYL) ETHER	790U	FLUORENE
790U	(3-AND/OR 4-)METHYLPHENOL	3800U	4-NITROANILINE
790U	N-NITROSODI-N-PROPYLAMINE	3800U	2-METHYL-4,6-DINITROPHENOL
790U	HEXACHLOROETHANE	790U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
790UR	NITROBENZENE	790U	4-BROMOPHENYL PHENYL ETHER
790U	ISOPHORONE	790U	HEXACHLOROBENZENE (HCB)
790U	2-NITROPHENOL	3800U	PENTACHLOROPHENOL
790U	2,4-DIMETHYLPHENOL	790U	PHENANTHRENE
3800U	BENZOIC ACID	790U	ANTHRACENE
790U	BIS(2-CHLOROETHOXY) METHANE	790U	DI-N-BUTYLPHTHALATE
790U	2,4-DICHLOROPHENOL	790U	FLUORANTHENE
790UR	1,2,4-TRICHLOROBENZENE	790U	PYRENE
790U	NAPHTHALENE	790U	BENZYL BUTYL PHTHALATE
790U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
790U	HEXACHLOROBUTADIENE	790U	BENZO(A)ANTHRACENE
790U	4-CHLORO-3-METHYLPHENOL	790U	CHRYSENE
790U	2-METHYLNAPHTHALENE	790U	BIS(2-ETHYLHEXYL) PHTHALATE
790U	HEXACHLOROCYCLOPENTADIENE (HCCP)	790U	DI-N-OCTYLPHTHALATE
790U	2,4,6-TRICHLOROPHENOL	790U	BENZO(B AND/OR K)FLUORANTHENE
3800U	2,4,5-TRICHLOROPHENOL	790U	BENZO-A-PYRENE
790UR	2-CHLORONAPHTHALENE	790U	INDENO (1,2,3-CD) PYRENE
3800U	2-NITROANILINE	790U	DIBENZO(A,H)ANTHRACENE
790U	DIMETHYL PHTHALATE	790U	BENZO(GHI)PERYLENE
790U	ACENAPHTHYLENE	16	PERCENT MOISTURE
790U	2,6-DINITROTOLUENE		

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL — PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL — CITY: PALMETTO ST: FL
STATION ID: SS-05 — COLLECTION START: 10/18/90 0900 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y170

UG/KG	ANALYTICAL RESULTS
770U	PHENOL
770U	BIS(2-CHLOROETHYL) ETHER
770U	2-CHLOROPHENOL
770U	1,3-DICHLOROBENZENE
770U	1,4-DICHLOROBENZENE
770U	BENZYL ALCOHOL
770U	1,2-DICHLOROBENZENE
770U	2-METHYLPHENOL
770UR	BIS(2-CHLOROISOPROPYL) ETHER
770U	(3-AND/OR 4-)METHYLPHENOL
770U	N-NITROSODI-N-PROPYLAMINE
770U	HEXACHLOROETHANE
770UR	NITROBENZENE
770U	ISOPHORONE
770U	2-NITROPHENOL
770U	2,4-DIMETHYLPHENOL
3700U	BENZOIC ACID
770U	BIS(2-CHLOROETHOXY) METHANE
770U	2,4-DICHLOROPHENOL
770UR	1,2,4-TRICHLOROBENZENE
770U	NAPHTHALENE
770U	4-CHLOROANILINE
770U	HEXACHLOROBUTADIENE
770U	4-CHLORO-3-METHYLPHENOL
770U	2-METHYLNAPHTHALENE
770U	HEXACHLOROCYCLOPENTADIENE (HCCP)
770U	2,4,6-TRICHLOROPHENOL
3700U	2,4,5-TRICHLOROPHENOL
770UR	2-CHLORONAPHTHALENE
3700U	2-NITROANILINE
770U	DIMETHYL PHTHALATE
770U	ACENAPHTHYLENE
770U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
3700UR	3-NITROANILINE
770UR	ACENAPHTHENE
3700U	2,4-DINITROPHENOL
3700U	4-NITROPHENOL
770U	DIBENZOFURAN
770U	2,4-DINITROTOLUENE
770U	DIETHYL PHTHALATE
770U	4-CHLOROPHENYL PHENYL ETHER
770U	FLUORENE
3700U	4-NITROANILINE
3700U	2-METHYL-4,6-DINITROPHENOL
770U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
770U	4-BROMOPHENYL PHENYL ETHER
770U	HEXACHLOROBENZENE (HCB)
3700U	PENTACHLOROPHENOL
770U	PHENANTHRENE
770U	ANTHRACENE
120J	DI-N-BUTYLPHTHALATE
770U	FLUORANTHENE
770U	PYRENE
770U	BENZYL BUTYL PHTHALATE
1500U	3,3'-DICHLOROBENZIDINE
770U	BENZO(A)ANTHRACENE
770U	CHRYSENE
770U	BIS(2-ETHYLHEXYL) PHTHALATE
770U	DI-N-OCTYLPHTHALATE
770U	BENZO(B AND/OR K)FLUORANTHENE
770U	BENZO-A-PYRENE
770U	INDENO (1,2,3-CD) PYRENE
770U	DIBENZO(A,H)ANTHRACENE
770U	BENZO(GHI)PERYLENE
14	PERCENT MOISTURE

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51667 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-07

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1150 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y153

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
480J	PHENOL	3900UR	3-NITROANILINE
800U	BIS(2-CHLOROETHYL) ETHER	800U	ACENAPHTHENE
800U	2-CHLOROPHENOL	3900U	2,4-DINITROPHENOL
800U	1,3-DICHLOROBENZENE	3900U	4-NITROPHENOL
800U	1,4-DICHLOROBENZENE	800U	DIBENZOFURAN
800U	BENZYL ALCOHOL	800U	2,4-DINITROTOLUENE
800U	1,2-DICHLOROBENZENE	800U	DIETHYL PHTHALATE
800U	2-METHYLPHENOL	800U	4-CHLOROPHENYL PHENYL ETHER
800UR	BIS(2-CHLOROISOPROPYL) ETHER	800U	FLUORENE
800U	(3-AND/OR 4-)METHYLPHENOL	3900U	4-NITROANILINE
800U	N-NITROSODI-N-PROPYLAMINE	3900U	2-METHYL-4,6-DINITROPHENOL
800U	HEXACHLOROETHANE	800U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
800UR	NITROBENZENE	800U	4-BROMOPHENYL PHENYL ETHER
800U	ISOPHORONE	800U	HEXACHLOROBENZENE (HCB)
800U	2-NITROPHENOL	3900U	PENTACHLOROPHENOL
800U	2,4-DIMETHYLPHENOL	800U	PHENANTHRENE
3900U	BENZOIC ACID	800U	ANTHRACENE
800U	BIS(2-CHLOROETHOXY) METHANE	800U	DI-N-BUTYLPHTHALATE
800U	2,4-DICHLOROPHENOL	800U	FLUORANTHENE
800UR	1,2,4-TRICHLOROBENZENE	800U	PYRENE
800U	NAPHTHALENE	800U	BENZYL BUTYL PHTHALATE
800U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
800U	HEXACHLOROBUTADIENE	800U	BENZO(A)ANTHRACENE
800U	4-CHLORO-3-METHYLPHENOL	800U	CHRYSENE
800U	2-METHYLNAPHTHALENE	800U	BIS(2-ETHYLHEXYL) PHTHALATE
800U	HEXACHLOROCYCLOPENTADIENE (HCCP)	800U	DI-N-OCTYLPHTHALATE
800U	2,4,6-TRICHLOROPHENOL	800U	BENZO(B AND/OR K)FLUORANTHENE
3900U	2,4,5-TRICHLOROPHENOL	800U	BENZO-A-PYRENE
800UR	2-CHLORONAPHTHALENE	800U	INDENO (1,2,3-CD) PYRENE
3900U	2-NITROANILINE	800U	DIBENZO(A,H)ANTHRACENE
800U	DIMETHYL PHTHALATE	800U	BENZO(GHI)PERYLENE
800U	ACENAPHTHYLENE	17	PERCENT MOISTURE
800U	2,6-DINITROTOLUENE		

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.　　01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025　SAMPLE NO. 51668　SAMPLE TYPE: SOIL　PROG ELEM: NSF　COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL　CITY: PALMETTO　ST: FL
STATION ID: SS-06　COLLECTION START: 10/17/90 1205　STOP: 00/00/00

CASE NO.: 15099　SAS NO.:　D. NO.: Y152

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
820U	PHENOL	4000UR	3-NITROANILINE
820U	BIS(2-CHLOROETHYL) ETHER	820U	ACENAPHTHENE
820U	2-CHLOROPHENOL	4000U	2,4-DINITROPHENOL
820U	1,3-DICHLOROBENZENE	4000U	4-NITROPHENOL
820U	1,4-DICHLOROBENZENE	820U	DIBENZOFURAN
820U	BENZYL ALCOHOL	820U	2,4-DINITROTOLUENE
820U	1,2-DICHLOROBENZENE	820U	DIETHYL PHTHALATE
820U	2-METHYLPHENOL	820U	4-CHLOROPHENYL PHENYL ETHER
820UR	BIS(2-CHLOROISOPROPYL) ETHER	820U	FLUORENE
820U	(3-AND/OR 4-)METHYLPHENOL	4000U	4-NITROANILINE
820U	N-NITROSODI-N-PROPYLAMINE	4000U	2-METHYL-4,6-DINITROPHENOL
820U	HEXACHLOROETHANE	820U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
820UR	NITROBENZENE	820U	4-BROMOPHENYL PHENYL ETHER
820U	ISOPHORONE	820U	HEXACHLOROBENZENE (HCB)
820U	2-NITROPHENOL	4000U	PENTACHLOROPHENOL
820U	2,4-DIMETHYLPHENOL	820U	PHENANTHRENE
4000U	BENZOIC ACID	820U	ANTHRACENE
820U	BIS(2-CHLOROETHOXY) METHANE	820U	DI-N-BUTYLPHTHALATE
820U	2,4-DICHLOROPHENOL	820U	FLUORANTHENE
820UR	1,2,4-TRICHLOROBENZENE	820U	PYRENE
820U	NAPHTHALENE	820U	BENZYL BUTYL PHTHALATE
820U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
820U	HEXACHLOROBUTADIENE	820U	BENZO(A)ANTHRACENE
820U	4-CHLORO-3-METHYLPHENOL	820U	CHRYSENE
820U	2-METHYLNAPHTHALENE	820U	BIS(2-ETHYLHEXYL) PHTHALATE
820U	HEXACHLOROCYCLOPENTADIENE (HCCP)	820U	DI-N-OCTYLPHTHALATE
820U	2,4,6-TRICHLOROPHENOL	820U	BENZO(B AND/OR K)FLUORANTHENE
4000U	2,4,5-TRICHLOROPHENOL	820U	BENZO-A-PYRENE
820UR	2-CHLORONAPHTHALENE	820U	INDENO (1,2,3-CD) PYRENE
4000U	2-NITROANILINE	820U	DIBENZO(A,H)ANTHRACENE
820U	DIMETHYL PHTHALATE	820U	BENZO(GHI)PERYLENE
820U	ACENAPHTHYLENE	20	PERCENT MOISTURE
820U	2,6-DINITROTOLUENE		

REMARKS　　***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE　*NA-NOT ANALYZED　*NAI-INTERFERENCES　*J-ESTIMATED VALUE　*N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN　*L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-12 COLLECTION START: 10/17/90 1230 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y154

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
970U	PHENOL	4700UR	3-NITROANILINE
970U	BIS(2-CHLOROETHYL) ETHER	970U	ACENAPHTHENE
970U	2-CHLOROPHENOL	4700U	2,4-DINITROPHENOL
970U	1,3-DICHLOROBENZENE	4700U	4-NITROPHENOL
970U	1,4-DICHLOROBENZENE	970U	DIBENZOFURAN
970U	BENZYL ALCOHOL	970U	2,4-DINITROTOLUENE
970U	1,2-DICHLOROBENZENE	970U	DIETHYL PHTHALATE
970U	2-METHYLPHENOL	970U	4-CHLOROPHENYL PHENYL ETHER
970UR	BIS(2-CHLOROISOPROPYL) ETHER	970U	FLUORENE
970U	(3-AND/OR 4-)METHYLPHENOL	4700U	4-NITROANILINE
970U	N-NITROSODI-N-PROPYLAMINE	4700U	2-METHYL-4,6-DINITROPHENOL
970U	HEXACHLOROETHANE	970U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
970UR	NITROBENZENE	970U	4-BROMOPHENYL PHENYL ETHER
970U	ISOPHORONE	970U	HEXACHLOROBENZENE (HCB)
970U	2-NITROPHENOL	4700U	PENTACHLOROPHENOL
970U	2,4-DIMETHYLPHENOL	970U	PHENANTHRENE
4700U	BENZOIC ACID	970U	ANTHRACENE
970U	BIS(2-CHLOROETHOXY) METHANE	970U	DI-N-BUTYLPHTHALATE
970U	2,4-DICHLOROPHENOL	970U	FLUORANTHENE
970UR	1,2,4-TRICHLOROBENZENE	970U	PYRENE
970U	NAPHTHALENE	970U	BENZYL BUTYL PHTHALATE
970U	4-CHLOROANILINE	1900U	3,3'-DICHLOROBENZIDINE
970U	HEXACHLOROBUTADIENE	970U	BENZO(A)ANTHRACENE
970U	4-CHLORO-3-METHYLPHENOL	970U	CHRYSENE
970U	2-METHYLNAPHTHALENE	970U	BIS(2-ETHYLHEXYL) PHTHALATE
970U	HEXACHLOROCYCLOPENTADIENE (HCCP)	970U	DI-N-OCTYLPHTHALATE
970U	2,4,6-TRICHLOROPHENOL	970U	BENZO(B AND/OR K)FLUORANTHENE
4700U	2,4,5-TRICHLOROPHENOL	970U	BENZO-A-PYRENE
970UR	2-CHLORONAPHTHALENE	970U	INDENO (1,2,3-CD) PYRENE
4700U	2-NITROANILINE	970U	DIBENZO(A,H)ANTHRACENE
970U	DIMETHYL PHTHALATE	970U	BENZO(GHI)PERYLENE
970U	ACENAPHTHYLENE	32	PERCENT MOISTURE
970U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE: PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: CITY: PALMETTO ST: FL
STATION ID: SB-06 COLLECTION START: 10/17/90 1215 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y155

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
790U	PHENOL	3800UR	3-NITROANILINE
790U	BIS(2-CHLOROETHYL) ETHER	790U	ACENAPHTHENE
790U	2-CHLOROPHENOL	3800U	2,4-DINITROPHENOL
790U	1,3-DICHLOROBENZENE	3800U	4-NITROPHENOL
790U	1,4-DICHLOROBENZENE	790U	DIBENZOFURAN
790U	BENZYL ALCOHOL	790U	2,4-DINITROTOLUENE
790U	1,2-DICHLOROBENZENE	790U	DIETHYL PHTHALATE
790U	2-METHYLPHENOL	790U	4-CHLOROPHENYL PHENYL ETHER
790UR	BIS(2-CHLOROISOPROPYL) ETHER	790U	FLUORENE
790U	(3-AND/OR 4-)METHYLPHENOL	3800U	4-NITROANILINE
790U	N-NITROSODI-N-PROPYLAMINE	3800U	2-METHYL-4,6-DINITROPHENOL
790U	HEXACHLOROETHANE	790U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
790UR	NITROBENZENE	790U	4-BROMOPHENYL PHENYL ETHER
790U	ISOPHORONE	790U	HEXACHLOROBENZENE (HCB)
790U	2-NITROPHENOL	3800U	PENTACHLOROPHENOL
790U	2,4-DIMETHYLPHENOL	790U	PHENANTHRENE
3800U	BENZOIC ACID	790U	ANTHRACENE
790U	BIS(2-CHLOROETHOXY) METHANE	790U	DI-N-BUTYLPHTHALATE
790U	2,4-DICHLOROPHENOL	790U	FLUORANTHENE
790UR	1,2,4-TRICHLOROBENZENE	790U	PYRENE
790U	NAPHTHALENE	790U	BENZYL BUTYL PHTHALATE
790U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
790U	HEXACHLOROBUTADIENE	790U	BENZO(A)ANTHRACENE
790U	4-CHLORO-3-METHYLPHENOL	790U	CHRYSENE
790U	2-METHYLNAPHTHALENE	790U	BIS(2-ETHYLHEXYL) PHTHALATE
790U	HEXACHLOROCYCLOPENTADIENE (HCCP)	790U	DI-N-OCTYLPHTHALATE
790U	2,4,6-TRICHLOROPHENOL	790U	BENZO(B AND/OR K)FLUORANTHENE
3800U	2,4,5-TRICHLOROPHENOL	790U	BENZO-A-PYRENE
790UR	2-CHLORONAPHTHALENE	790U	INDENO (1,2,3-CD) PYRENE
3800U	2-NITROANILINE	790U	DIBENZO(A,H)ANTHRACENE
790U	DIMETHYL PHTHALATE	790U	BENZO(GHI)PERYLENE
790U	ACENAPHTHYLENE	16	PERCENT MOISTURE
790U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51671 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-03 COLLECTION START: 10/17/90 1135 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y149

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
810U	PHENOL	4000UR	3-NITROANILINE
810U	BIS(2-CHLOROETHYL) ETHER	810U	ACENAPHTHENE
810U	2-CHLOROPHENOL	4000U	2,4-DINITROPHENOL
810U	1,3-DICHLOROBENZENE	4000U	4-NITROPHENOL
810U	1,4-DICHLOROBENZENE	810U	DIBENZOFURAN
810U	BENZYL ALCOHOL	810U	2,4-DINITROTOLUENE
810U	1,2-DICHLOROBENZENE	810U	DIETHYL PHTHALATE
810U	2-METHYLPHENOL	810U	4-CHLOROPHENYL PHENYL ETHER
810UR	BIS(2-CHLOROISOPROPYL) ETHER	810U	FLUORENE
810U	(3-AND/OR 4-)METHYLPHENOL	4000U	4-NITROANILINE
810U	N-NITROSODI-N-PROPYLAMINE	4000U	2-METHYL-4,6-DINITROPHENOL
810U	HEXACHLOROETHANE	810U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
810UR	NITROBENZENE	810U	4-BROMOPHENYL PHENYL ETHER
810U	ISOPHORONE	810U	HEXACHLOROBENZENE (HCB)
810U	2-NITROPHENOL	4000U	PENTACHLOROPHENOL
810U	2,4-DIMETHYLPHENOL	810U	PHENANTHRENE
4000U	BENZOIC ACID	810U	ANTHRACENE
810U	BIS(2-CHLOROETHOXY) METHANE	810U	DI-N-BUTYLPHTHALATE
810U	2,4-DICHLOROPHENOL	810U	FLUORANTHENE
810UR	1,2,4-TRICHLOROBENZENE	810U	PYRENE
810U	NAPHTHALENE	810U	BENZYL BUTYL PHTHALATE
810U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
810U	HEXACHLOROBUTADIENE	810U	BENZO(A)ANTHRACENE
810U	4-CHLORO-3-METHYLPHENOL	810U	CHRYSENE
810U	2-METHYLNAPHTHALENE	810U	BIS(2-ETHYLHEXYL) PHTHALATE
810U	HEXACHLOROCYCLOPENTADIENE (HCCP)	810U	DI-N-OCTYLPHTHALATE
810U	2,4,6-TRICHLOROPHENOL	810U	BENZO(B AND/OR K)FLUORANTHENE
4000U	2,4,5-TRICHLOROPHENOL	810U	BENZO-A-PYRENE
810UR	2-CHLORONAPHTHALENE	810U	INDENO (1,2,3-CD) PYRENE
4000U	2-NITROANILINE	810U	DIBENZO(A,H)ANTHRACENE
810U	DIMETHYL PHTHALATE	810U	BENZO(GHI)PERYLENE
810U	ACENAPHTHYLENE	19	PERCENT MOISTURE
810U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51672 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: TW-03

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1145 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y151

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE

UG/L	ANALYTICAL RESULTS
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4-BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51673 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: MW-01

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1130 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y326

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51674 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-01 COLLECTION START: 10/16/90 1330 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y137

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

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FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-01
COLLECTION START: 10/16/90 1335 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y136

UG/KG	ANALYTICAL RESULTS
840U	PHENOL
840U	BIS(2-CHLOROETHYL) ETHER
840U	2-CHLOROPHENOL
840U	1,3-DICHLOROBENZENE
840U	1,4-DICHLOROBENZENE
840U	BENZYL ALCOHOL
840U	1,2-DICHLOROBENZENE
840U	2-METHYLPHENOL
840UR	BIS(2-CHLOROISOPROPYL) ETHER
840U	(3-AND/OR 4-)METHYLPHENOL
840U	N-NITROSODI-N-PROPYLAMINE
840U	HEXACHLOROETHANE
840UR	NITROBENZENE
840U	ISOPHORONE
840U	2-NITROPHENOL
840U	2,4-DIMETHYLPHENOL
4100U	BENZOIC ACID
840U	BIS(2-CHLOROETHOXY) METHANE
840U	2,4-DICHLOROPHENOL
840UR	1,2,4-TRICHLOROBENZENE
840U	NAPHTHALENE
840U	4-CHLOROANILINE
840U	HEXACHLOROBUTADIENE
840U	4-CHLORO-3-METHYLPHENOL
840U	2-METHYLNAPHTHALENE
840U	HEXACHLOROCYCLOPENTADIENE (HCCP)
840U	2,4,6-TRICHLOROPHENOL
4100U	2,4,5-TRICHLOROPHENOL
840UR	2-CHLORONAPHTHALENE
4100U	2-NITROANILINE
840U	DIMETHYL PHTHALATE
840U	ACENAPHTHYLENE
840U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
4100UR	3-NITROANILINE
840U	ACENAPHTHENE
4100U	2,4-DINITROPHENOL
4100U	4-NITROPHENOL
840U	DIBENZOFURAN
840U	2,4-DINITROTOLUENE
840U	DIETHYL PHTHALATE
840U	4-CHLOROPHENYL PHENYL ETHER
840U	FLUORENE
4100U	4-NITROANILINE
4100U	2-METHYL-4,6-DINITROPHENOL
840U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
840U	4-BROMOPHENYL PHENYL ETHER
840U	HEXACHLOROBENZENE (HCB)
4100U	PENTACHLOROPHENOL
580J	PHENANTHRENE
140J	ANTHRACENE
840U	DI-N-BUTYLPHTHALATE
1400	FLUORANTHENE
750J	PYRENE
840U	BENZYL BUTYL PHTHALATE
1700U	3,3'-DICHLOROBENZIDINE
330J	BENZO(A)ANTHRACENE
500J	CHRYSENE
840U	BIS(2-ETHYLHEXYL) PHTHALATE
840U	DI-N-OCTYLPHTHALATE
440J	BENZO(B AND/OR K)FLUORANTHENE
380J	BENZO-A-PYRENE
220J	INDENO (1,2,3-CD) PYRENE
840U	DIBENZO(A,H)ANTHRACENE
210J	BENZO(GHI)PERYLENE
21	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y329

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51677 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-02 COLLECTION START: 10/16/90 1415 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y141

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51678 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-02 COLLECTION START: 10/16/90 1420 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y140

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
2100U	PHENOL	10000UR	3-NITROANILINE
2100U	BIS(2-CHLOROETHYL) ETHER	2100U	ACENAPHTHENE
2100U	2-CHLOROPHENOL	10000U	2,4-DINITROPHENOL
2100U	1,3-DICHLOROBENZENE	10000U	4-NITROPHENOL
2100U	1,4-DICHLOROBENZENE	2100U	DIBENZOFURAN
2100U	BENZYL ALCOHOL	2100U	2,4-DINITROTOLUENE
2100U	1,2-DICHLOROBENZENE	2100U	DIETHYL PHTHALATE
2100U	2-METHYLPHENOL	2100U	4-CHLOROPHENYL PHENYL ETHER
2100UR	BIS(2-CHLOROISOPROPYL) ETHER	2100U	FLUORENE
2100U	(3-AND/OR 4-)METHYLPHENOL	10000U	4-NITROANILINE
2100U	N-NITROSODI-N-PROPYLAMINE	10000U	2-METHYL-4,6-DINITROPHENOL
2100U	HEXACHLOROETHANE	2100U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
2100UR	NITROBENZENE	2100U	4-BROMOPHENYL PHENYL ETHER
2100U	ISOPHORONE	2100U	HEXACHLOROBENZENE (HCB)
2100U	2-NITROPHENOL	10000U	PENTACHLOROPHENOL
2100U	2,4-DIMETHYLPHENOL	2100U	PHENANTHRENE
10000U	BENZOIC ACID	2100U	ANTHRACENE
2100U	BIS(2-CHLOROETHOXY) METHANE	2100U	DI-N-BUTYLPHTHALATE
2100U	2,4-DICHLOROPHENOL	2100U	FLUORANTHENE
2100UR	1,2,4-TRICHLOROBENZENE	2100U	PYRENE
2100U	NAPHTHALENE	2100U	BENZYL BUTYL PHTHALATE
2100U	4-CHLOROANILINE	4100U	3,3'-DICHLOROBENZIDINE
2100U	HEXACHLOROBUTADIENE	2100U	BENZO(A)ANTHRACENE
2100U	4-CHLORO-3-METHYLPHENOL	2100U	CHRYSENE
2100U	2-METHYLNAPHTHALENE	2100U	BIS(2-ETHYLHEXYL) PHTHALATE
2100U	HEXACHLOROCYCLOPENTADIENE (HCCP)	2100U	DI-N-OCTYLPHTHALATE
2100U	2,4,6-TRICHLOROPHENOL	2100U	BENZO(B AND/OR K)FLUORANTHENE
10000U	2,4,5-TRICHLOROPHENOL	2100U	BENZO-A-PYRENE
2100UR	2-CHLORONAPHTHALENE	2100U	INDENO (1,2,3-CD) PYRENE
10000U	2-NITROANILINE	2100U	DIBENZO(A,H)ANTHRACENE
2100U	DIMETHYL PHTHALATE	2100U	BENZO(GHI)PERYLENE
2100U	ACENAPHTHYLENE	68	PERCENT MOISTURE
2100U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51679 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-04 COLLECTION START: 10/16/90 1520 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y327

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	76	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51680 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-01

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1520 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y138

UG/KG	ANALYTICAL RESULTS
890U	PHENOL
890U	BIS(2-CHLOROETHYL) ETHER
890U	2-CHLOROPHENOL
890U	1,3-DICHLOROBENZENE
890U	1,4-DICHLOROBENZENE
890U	BENZYL ALCOHOL
890U	1,2-DICHLOROBENZENE
890U	2-METHYLPHENOL
890UR	BIS(2-CHLOROISOPROPYL) ETHER
890U	(3-AND/OR 4-)METHYLPHENOL
890U	N-NITROSODI-N-PROPYLAMINE
890U	HEXACHLOROETHANE
890UR	NITROBENZENE
890U	ISOPHORONE
890U	2-NITROPHENOL
890U	2,4-DIMETHYLPHENOL
4300U	BENZOIC ACID
890U	BIS(2-CHLOROETHOXY) METHANE
890U	2,4-DICHLOROPHENOL
890UR	1,2,4-TRICHLOROBENZENE
890U	NAPHTHALENE
890U	4-CHLOROANILINE
890U	HEXACHLOROBUTADIENE
890U	4-CHLORO-3-METHYLPHENOL
890U	2-METHYLNAPHTHALENE
890U	HEXACHLOROCYCLOPENTADIENE (HCCP)
890U	2,4,6-TRICHLOROPHENOL
4300U	2,4,5-TRICHLOROPHENOL
890UR	2-CHLORONAPHTHALENE
4300U	2-NITROANILINE
890U	DIMETHYL PHTHALATE
890U	ACENAPHTHYLENE
890U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
4300UR	3-NITROANILINE
890U	ACENAPHTHENE
4300U	2,4-DINITROPHENOL
4300U	4-NITROPHENOL
890U	DIBENZOFURAN
890U	2,4-DINITROTOLUENE
890U	DIETHYL PHTHALATE
890U	4-CHLOROPHENYL PHENYL ETHER
890U	FLUORENE
4300U	4-NITROANILINE
4300U	2-METHYL-4,6-DINITROPHENOL
890U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
890U	4-BROMOPHENYL PHENYL ETHER
890U	HEXACHLOROBENZENE (HCB)
4300U	PENTACHLOROPHENOL
890U	PHENANTHRENE
890U	ANTHRACENE
890U	DI-N-BUTYLPHTHALATE
890U	FLUORANTHENE
890U	PYRENE
890U	BENZYL BUTYL PHTHALATE
1800U	3,3'-DICHLOROBENZIDINE
890U	BENZO(A)ANTHRACENE
890U	CHRYSENE
890U	BIS(2-ETHYLHEXYL) PHTHALATE
890U	DI-N-OCTYLPHTHALATE
890U	BENZO(B AND/OR K)FLUORANTHENE
890U	BENZO-A-PYRENE
890U	INDENO (1,2,3-CD) PYRENE
890U	DIBENZO(A,H)ANTHRACENE
890U	BENZO(GHI)PERYLENE
26	PERCENT MOISTURE

REMARKS

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FOOTNOTES
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*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51681 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-01 COLLECTION START: 10/16/90 1535 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y139

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
800U	PHENOL	3900UR	3-NITROANILINE
800U	BIS(2-CHLOROETHYL) ETHER	800U	ACENAPHTHENE
800U	2-CHLOROPHENOL	3900U	2,4-DINITROPHENOL
800U	1,3-DICHLOROBENZENE	3900U	4-NITROPHENOL
800U	1,4-DICHLOROBENZENE	800U	DIBENZOFURAN
800U	BENZYL ALCOHOL	800U	2,4-DINITROTOLUENE
800U	1,2-DICHLOROBENZENE	800U	DIETHYL PHTHALATE
800U	2-METHYLPHENOL	800U	4-CHLOROPHENYL PHENYL ETHER
800UR	BIS(2-CHLOROISOPROPYL) ETHER	800U	FLUORENE
800U	(3-AND/OR 4-)METHYLPHENOL	3900U	4-NITROANILINE
800U	N-NITROSODI-N-PROPYLAMINE	3900U	2-METHYL-4,6-DINITROPHENOL
800U	HEXACHLOROETHANE	800U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
800UR	NITROBENZENE	800U	4-BROMOPHENYL PHENYL ETHER
800U	ISOPHORONE	800U	HEXACHLOROBENZENE (HCB)
800U	2-NITROPHENOL	3900U	PENTACHLOROPHENOL
800U	2,4-DIMETHYLPHENOL	800U	PHENANTHRENE
3900U	BENZOIC ACID	800U	ANTHRACENE
800U	BIS(2-CHLOROETHOXY) METHANE	800U	DI-N-BUTYLPHTHALATE
800U	2,4-DICHLOROPHENOL	800U	FLUORANTHENE
800UR	1,2,4-TRICHLOROBENZENE	800U	PYRENE
800U	NAPHTHALENE	800U	BENZYL BUTYL PHTHALATE
800U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
800U	HEXACHLOROBUTADIENE	800U	BENZO(A)ANTHRACENE
800U	4-CHLORO-3-METHYLPHENOL	800U	CHRYSENE
800U	2-METHYLNAPHTHALENE	800U	BIS(2-ETHYLHEXYL) PHTHALATE
800U	HEXACHLOROCYCLOPENTADIENE (HCCP)	800U	DI-N-OCTYLPHTHALATE
800U	2,4,6-TRICHLOROPHENOL	800U	BENZO(B AND/OR K)FLUORANTHENE
3900U	2,4,5-TRICHLOROPHENOL	800U	BENZO-A-PYRENE
800UR	2-CHLORONAPHTHALENE	800U	INDENO (1,2,3-CD) PYRENE
3900U	2-NITROANILINE	800U	DIBENZO(A,H)ANTHRACENE
800U	DIMETHYL PHTHALATE	800U	BENZO(GHI)PERYLENE
800U	ACENAPHTHYLENE	18	PERCENT MOISTURE
800U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51682 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: MW-06
PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1615 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y143

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4-BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51683 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-01 COLLECTION START: 10/16/90 1625 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y142

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51684 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: PW-01

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 0935 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y147

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
50U	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51685 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SS-02
COLLECTION START: 10/17/90 0925 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y144

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
720U	PHENOL	3500UR	3-NITROANILINE
720U	BIS(2-CHLOROETHYL) ETHER	720U	ACENAPHTHENE
720U	2-CHLOROPHENOL	3500U	2,4-DINITROPHENOL
720U	1,3-DICHLOROBENZENE	3500U	4-NITROPHENOL
720U	1,4-DICHLOROBENZENE	720U	DIBENZOFURAN
720U	BENZYL ALCOHOL	720U	2,4-DINITROTOLUENE
720U	1,2-DICHLOROBENZENE	720U	DIETHYL PHTHALATE
720U	2-METHYLPHENOL	720U	4-CHLOROPHENYL PHENYL ETHER
720UR	BIS(2-CHLOROISOPROPYL) ETHER	720U	FLUORENE
720U	(3-AND/OR 4-)METHYLPHENOL	3500U	4-NITROANILINE
720U	N-NITROSODI-N-PROPYLAMINE	3500U	2-METHYL-4,6-DINITROPHENOL
720U	HEXACHLOROETHANE	720U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
720UR	NITROBENZENE	720U	4-BROMOPHENYL PHENYL ETHER
720U	ISOPHORONE	720U	HEXACHLOROBENZENE (HCB)
720U	2-NITROPHENOL	3500U	PENTACHLOROPHENOL
720U	2,4-DIMETHYLPHENOL	720U	PHENANTHRENE
3500U	BENZOIC ACID	720U	ANTHRACENE
720U	BIS(2-CHLOROETHOXY) METHANE	720U	DI-N-BUTYLPHTHALATE
720U	2,4-DICHLOROPHENOL	720U	FLUORANTHENE
720UR	1,2,4-TRICHLOROBENZENE	720U	PYRENE
720U	NAPHTHALENE	720U	BENZYL BUTYL PHTHALATE
720U	4-CHLOROANILINE	1400U	3,3'-DICHLOROBENZIDINE
720U	HEXACHLOROBUTADIENE	720U	BENZO(A)ANTHRACENE
720U	4-CHLORO-3-METHYLPHENOL	720U	CHRYSENE
720U	2-METHYLNAPHTHALENE	720U	BIS(2-ETHYLHEXYL) PHTHALATE
720U	HEXACHLOROCYCLOPENTADIENE (HCCP)	720U	DI-N-OCTYLPHTHALATE
720U	2,4,6-TRICHLOROPHENOL	720U	BENZO(B AND/OR K)FLUORANTHENE
3500U	2,4,5-TRICHLOROPHENOL	720U	BENZO-A-PYRENE
720UR	2-CHLORONAPHTHALENE	720U	INDENO (1,2,3-CD) PYRENE
3500U	2-NITROANILINE	720U	DIBENZO(A,H)ANTHRACENE
720U	DIMETHYL PHTHALATE	720U	BENZO(GHI)PERYLENE
720U	ACENAPHTHYLENE	8	PERCENT MOISTURE
720U	2,6-DINITROTOLUENE		

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51686 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SB-02 COLLECTION START: 10/17/90 0945 STOP: 00/00/00 **
** **
** CASE NO.: 15099 SAS NO.: D. NO.: Y145 **
*** ***

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
790U	PHENOL	3800UR	3-NITROANILINE
790U	BIS(2-CHLOROETHYL) ETHER	790U	ACENAPHTHENE
790U	2-CHLOROPHENOL	3800U	2,4-DINITROPHENOL
790U	1,3-DICHLOROBENZENE	3800U	4-NITROPHENOL
790U	1,4-DICHLOROBENZENE	790U	DIBENZOFURAN
790U	BENZYL ALCOHOL	790U	2,4-DINITROTOLUENE
790U	1,2-DICHLOROBENZENE	790U	DIETHYL PHTHALATE
790U	2-METHYLPHENOL	790U	4-CHLOROPHENYL PHENYL ETHER
790UR	BIS(2-CHLOROISOPROPYL) ETHER	790U	FLUORENE
790U	(3-AND/OR 4-)METHYLPHENOL	3800U	4-NITROANILINE
790U	N-NITROSODI-N-PROPYLAMINE	3800U	2-METHYL-4,6-DINITROPHENOL
790U	HEXACHLOROETHANE	790U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
790UR	NITROBENZENE	790U	4-BROMOPHENYL PHENYL ETHER
790U	ISOPHORONE	790U	HEXACHLOROBENZENE (HCB)
790U	2-NITROPHENOL	3800U	PENTACHLOROPHENOL
790U	2,4-DIMETHYLPHENOL	790U	PHENANTHRENE
3800U	BENZOIC ACID	790U	ANTHRACENE
790U	BIS(2-CHLOROETHOXY) METHANE	790U	DI-N-BUTYLPHTHALATE
790U	2,4-DICHLOROPHENOL	790U	FLUORANTHENE
790UR	1,2,4-TRICHLOROBENZENE	790U	PYRENE
790U	NAPHTHALENE	790U	BENZYL BUTYL PHTHALATE
790U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
790U	HEXACHLOROBUTADIENE	790U	BENZO(A)ANTHRACENE
790U	4-CHLORO-3-METHYLPHENOL	790U	CHRYSENE
790U	2-METHYLNAPHTHALENE	790U	BIS(2-ETHYLHEXYL) PHTHALATE
790U	HEXACHLOROCYCLOPENTADIENE (HCCP)	790U	DI-N-OCTYLPHTHALATE
790U	2,4,6-TRICHLOROPHENOL	790U	BENZO(B AND/OR K)FLUORANTHENE
3800U	2,4,5-TRICHLOROPHENOL	790U	BENZO-A-PYRENE
790UR	2-CHLORONAPHTHALENE	790U	INDENO (1,2,3-CD) PYRENE
3800U	2-NITROANILINE	790U	DIBENZO(A,H)ANTHRACENE
790U	DIMETHYL PHTHALATE	790U	BENZO(GHI)PERYLENE
790U	ACENAPHTHYLENE	16	PERCENT MOISTURE
790U	2,6-DINITROTOLUENE		

REMARKS ***REMARKS***

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*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-03 COLLECTION START: 10/17/90 0900 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y328

UG/L	ANALYTICAL RESULTS
10U	PHENOL
10U	BIS(2-CHLOROETHYL) ETHER
10U	2-CHLOROPHENOL
10U	1,3-DICHLOROBENZENE
10U	1,4-DICHLOROBENZENE
10U	BENZYL ALCOHOL
10U	1,2-DICHLOROBENZENE
10U	2-METHYLPHENOL
10U	BIS(2-CHLOROISOPROPYL) ETHER
10U	(3-AND/OR 4-)METHYLPHENOL
10U	N-NITROSODI-N-PROPYLAMINE
10U	HEXACHLOROETHANE
10U	NITROBENZENE
10U	ISOPHORONE
10U	2-NITROPHENOL
10U	2,4-DIMETHYLPHENOL
50U	BENZOIC ACID
10U	BIS(2-CHLOROETHOXY) METHANE
10U	2,4-DICHLOROPHENOL
10U	1,2,4-TRICHLOROBENZENE
10U	NAPHTHALENE
10U	4-CHLOROANILINE
10U	HEXACHLOROBUTADIENE
10U	4-CHLORO-3-METHYLPHENOL
10U	2-METHYLNAPHTHALENE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)
10U	2,4,6-TRICHLOROPHENOL
50U	2,4,5-TRICHLOROPHENOL
10U	2-CHLORONAPHTHALENE
50U	2-NITROANILINE
10U	DIMETHYL PHTHALATE
10U	ACENAPHTHYLENE
10U	2,6-DINITROTOLUENE

UG/L	ANALYTICAL RESULTS
50U	3-NITROANILINE
10U	ACENAPHTHENE
50U	2,4-DINITROPHENOL
50U	4-NITROPHENOL
10U	DIBENZOFURAN
10U	2,4-DINITROTOLUENE
10U	DIETHYL PHTHALATE
10U	4-CHLOROPHENYL PHENYL ETHER
10U	FLUORENE
50U	4-NITROANILINE
50U	2-METHYL-4,6-DINITROPHENOL
10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	4-BROMOPHENYL PHENYL ETHER
10U	HEXACHLOROBENZENE (HCB)
50U	PENTACHLOROPHENOL
10U	PHENANTHRENE
10U	ANTHRACENE
10UJ	DI-N-BUTYLPHTHALATE
10U	FLUORANTHENE
10U	PYRENE
10U	BENZYL BUTYL PHTHALATE
20U	3,3'-DICHLOROBENZIDINE
10UJ	BENZO(A)ANTHRACENE
10U	CHRYSENE
10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	DI-N-OCTYLPHTHALATE
10U	BENZO(B AND/OR K)FLUORANTHENE
10U	BENZO-A-PYRENE
10U	INDENO (1,2,3-CD) PYRENE
10U	DIBENZO(A,H)ANTHRACENE
10U	BENZO(GHI)PERYLENE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-10 COLLECTION START: 10/17/90 1045 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y150

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
10000	PHENOL	5900UR	3-NITROANILINE
1200U	BIS(2-CHLOROETHYL) ETHER	1200U	ACENAPHTHENE
1200U	2-CHLOROPHENOL	5900U	2,4-DINITROPHENOL
1200U	1,3-DICHLOROBENZENE	5900U	4-NITROPHENOL
1200U	1,4-DICHLOROBENZENE	1200U	DIBENZOFURAN
1200U	BENZYL ALCOHOL	1200U	2,4-DINITROTOLUENE
1200U	1,2-DICHLOROBENZENE	1200U	DIETHYL PHTHALATE
1200U	2-METHYLPHENOL	1200U	4-CHLOROPHENYL PHENYL ETHER
1200UR	BIS(2-CHLOROISOPROPYL) ETHER	1200U	FLUORENE
1200U	(3-AND/OR 4-)METHYLPHENOL	5900U	4-NITROANILINE
1200U	N-NITROSODI-N-PROPYLAMINE	5900U	2-METHYL-4,6-DINITROPHENOL
1200U	HEXACHLOROETHANE	1200U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
1200UR	NITROBENZENE	1200U	4-BROMOPHENYL PHENYL ETHER
1200U	ISOPHORONE	1200U	HEXACHLOROBENZENE (HCB)
1200U	2-NITROPHENOL	5900U	PENTACHLOROPHENOL
1200U	2,4-DIMETHYLPHENOL	1200U	PHENANTHRENE
690J	BENZOIC ACID	1200U	ANTHRACENE
1200U	BIS(2-CHLOROETHOXY) METHANE	1200U	DI-N-BUTYLPHTHALATE
1200U	2,4-DICHLOROPHENOL	1200U	FLUORANTHENE
1200UR	1,2,4-TRICHLOROBENZENE	1200U	PYRENE
1200U	NAPHTHALENE	1200U	BENZYL BUTYL PHTHALATE
1200U	4-CHLOROANILINE	2400U	3,3'-DICHLOROBENZIDINE
1200U	HEXACHLOROBUTADIENE	1200U	BENZO(A)ANTHRACENE
1200U	4-CHLORO-3-METHYLPHENOL	1200U	CHRYSENE
1200U	2-METHYLNAPHTHALENE	1200U	BIS(2-ETHYLHEXYL) PHTHALATE
1200U	HEXACHLOROCYCLOPENTADIENE (HCCP)	1200U	DI-N-OCTYLPHTHALATE
1200U	2,4,6-TRICHLOROPHENOL	1200U	BENZO(B AND/OR K)FLUORANTHENE
5900U	2,4,5-TRICHLOROPHENOL	1200U	BENZO-A-PYRENE
1200UR	2-CHLORONAPHTHALENE	1200U	INDENO (1,2,3-CD) PYRENE
5900U	2-NITROANILINE	1200U	DIBENZO(A,H)ANTHRACENE
1200U	DIMETHYL PHTHALATE	1200U	BENZO(GHI)PERYLENE
1200U	ACENAPHTHYLENE	46	PERCENT MOISTURE
1200U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51689 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-03 COLLECTION START: 10/17/90 1020 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y148

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
820U	PHENOL	4000UR	3-NITROANILINE
820U	BIS(2-CHLOROETHYL) ETHER	820U	ACENAPHTHENE
820U	2-CHLOROPHENOL	4000U	2,4-DINITROPHENOL
820U	1,3-DICHLOROBENZENE	4000U	4-NITROPHENOL
820U	1,4-DICHLOROBENZENE	820U	DIBENZOFURAN
820U	BENZYL ALCOHOL	820U	2,4-DINITROTOLUENE
820U	1,2-DICHLOROBENZENE	820U	DIETHYL PHTHALATE
820U	2-METHYLPHENOL	820U	4-CHLOROPHENYL PHENYL ETHER
820UR	BIS(2-CHLOROISOPROPYL) ETHER	820U	FLUORENE
820U	(3-AND/OR 4-)METHYLPHENOL	4000U	4-NITROANILINE
820U	N-NITROSODI-N-PROPYLAMINE	4000U	2-METHYL-4,6-DINITROPHENOL
820U	HEXACHLOROETHANE	820U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
820UR	NITROBENZENE	820U	4-BROMOPHENYL PHENYL ETHER
820U	ISOPHORONE	820U	HEXACHLOROBENZENE (HCB)
820U	2-NITROPHENOL	4000U	PENTACHLOROPHENOL
820U	2,4-DIMETHYLPHENOL	820U	PHENANTHRENE
4000U	BENZOIC ACID	820U	ANTHRACENE
820U	BIS(2-CHLOROETHOXY) METHANE	820U	DI-N-BUTYLPHTHALATE
820U	2,4-DICHLOROPHENOL	820U	FLUORANTHENE
820UR	1,2,4-TRICHLOROBENZENE	820U	PYRENE
820U	NAPHTHALENE	820U	BENZYL BUTYL PHTHALATE
820U	4-CHLOROANILINE	1600U	3,3'-DICHLOROBENZIDINE
820U	HEXACHLOROBUTADIENE	820U	BENZO(A)ANTHRACENE
820U	4-CHLORO-3-METHYLPHENOL	820U	CHRYSENE
820U	2-METHYLNAPHTHALENE	820U	BIS(2-ETHYLHEXYL) PHTHALATE
820U	HEXACHLOROCYCLOPENTADIENE (HCCP)	820U	DI-N-OCTYLPHTHALATE
820U	2,4,6-TRICHLOROPHENOL	820U	BENZO(B AND/OR K)FLUORANTHENE
4000U	2,4,5-TRICHLOROPHENOL	820U	BENZO-A-PYRENE
820UR	2-CHLORONAPHTHALENE	820U	INDENO (1,2,3-CD) PYRENE
4000U	2-NITROANILINE	820U	DIBENZO(A,H)ANTHRACENE
820U	DIMETHYL PHTHALATE	820U	BENZO(GHI)PERYLENE
820U	ACENAPHTHYLENE	20	PERCENT MOISTURE
820U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51690 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-02 COLLECTION START: 10/17/90 1040 STOP: 00/00/00

CASE NO.: 15099 SAS NO.: D. NO.: Y146

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	BENZYL ALCOHOL	10U	2,4-DINITROTOLUENE
10U	1,2-DICHLOROBENZENE	10U	DIETHYL PHTHALATE
10U	2-METHYLPHENOL	10U	4-CHLOROPHENYL PHENYL ETHER
10U	BIS(2-CHLOROISOPROPYL) ETHER	10U	FLUORENE
10U	(3-AND/OR 4-)METHYLPHENOL	50U	4-NITROANILINE
10U	N-NITROSODI-N-PROPYLAMINE	50U	2-METHYL-4,6-DINITROPHENOL
10U	HEXACHLOROETHANE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	NITROBENZENE	10U	4-BROMOPHENYL PHENYL ETHER
10U	ISOPHORONE	10U	HEXACHLOROBENZENE (HCB)
10U	2-NITROPHENOL	50U	PENTACHLOROPHENOL
10U	2,4-DIMETHYLPHENOL	10U	PHENANTHRENE
42J	BENZOIC ACID	10U	ANTHRACENE
10U	BIS(2-CHLOROETHOXY) METHANE	10UJ	DI-N-BUTYLPHTHALATE
10U	2,4-DICHLOROPHENOL	10U	FLUORANTHENE
10U	1,2,4-TRICHLOROBENZENE	10U	PYRENE
10U	NAPHTHALENE	10U	BENZYL BUTYL PHTHALATE
10U	4-CHLOROANILINE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROBUTADIENE	10UJ	BENZO(A)ANTHRACENE
10U	4-CHLORO-3-METHYLPHENOL	10U	CHRYSENE
10U	2-METHYLNAPHTHALENE	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	DI-N-OCTYLPHTHALATE
10U	2,4,6-TRICHLOROPHENOL	10U	BENZO(B AND/OR K)FLUORANTHENE
50U	2,4,5-TRICHLOROPHENOL	10U	BENZO-A-PYRENE
10U	2-CHLORONAPHTHALENE	10U	INDENO (1,2,3-CD) PYRENE
50U	2-NITROANILINE	10U	DIBENZO(A,H)ANTHRACENE
10U	DIMETHYL PHTHALATE	10U	BENZO(GHI)PERYLENE
10U	ACENAPHTHYLENE		
10U	2,6-DINITROTOLUENE		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51643  SAMPLE TYPE: SOIL        PROG ELEM: NSF    COLLECTED BY: M GORDON                  **
**   SOURCE: AMAX PHOSPHATE FACIL                                      CITY: PALMETTO              ST: FL                           **
**   STATION ID: SD-05                                                 COLLECTION START: 10/15/90  1655   STOP: 00/00/00            **
**   CASE.NO.: 15099          SAS NO.:                                 D. NO.: Y168                MD NO: Y168                      **
**                                                                                                                                  **
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ANALYTICAL RESULTS UG/KG

3000J   3 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51645 SAMPLE TYPE:	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE:	CITY: PALMETTO ST: FL
STATION ID: SD-04	COLLECTION START: 10/17/90 1630 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:	D. NO.: Y166 MD NO: Y166

ANALYTICAL RESULTS UG/KG

2000J 1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51646   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-04   COLLECTION START: 10/17/90 1620   STOP: 00/00/00
CASE.NO.: 15099   SAS NO.:   D. NO.: Y167   MD NO: Y167

ANALYTICAL RESULTS UG/L

4JN BROMACIL

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51647  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                     **
**   STATION ID: SW-08                                                COLLECTION START: 10/17/90  1605  STOP: 00/00/00       **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y165                MD NO: Y165                **
**                                                                                                                           **
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ANALYTICAL RESULTS UG/L

4JN	BROMACIL

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51648   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-08   COLLECTION START: 10/17/90 1610   STOP: 00/00/00
CASE.NO.: 15099   SAS NO.:   D. NO.: Y164   MD NO: Y164

ANALYTICAL RESULTS UG/KG

500JN	TETRAHYDRODIMETHYL(METHYLETHYL)NAPHTHALENE
20000J	7 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-11 COLLECTION START: 10/17/90 1505 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y159 MD NO: Y159 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

50000J	17 UNIDENTIFIED COMPOUNDS
N	PETROLEUM PRODUCT

FOOTNOTES
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*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y158 MD NO: Y158

ANALYTICAL RESULTS UG/L

7JN	TETRADECANOIC ACID
10JN	HEXADECANOIC ACID

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51651  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO            ST: FL                      **
**   STATION ID: SW-09                                                COLLECTION START: 10/17/90  1515   STOP: 00/00/00     **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y163                MD NO: Y163               **
**                                                                                                                          **
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ANALYTICAL RESULTS UG/L

10JN	HEXADECANOIC ACID
5JN	HYDROXYMETHOXYBENZALDEHYDE
60J	4 UNIDENTIFIED COMPOUNDS
N	PETROLEUM PRODUCT

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-09
COLLECTION START: 10/17/90 1530 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:
D. NO.: Y162 MD NO: Y162

ANALYTICAL RESULTS UG/KG

5000J	2 UNIDENTIFIED COMPOUNDS
1000JN	DODECANOIC ACID
400JN	HEPTADECANOIC ACID
800JN	OCTADECANOIC ACID

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-07 COLLECTION START: 10/17/90 1520 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y160 MD NO: Y160

ANALYTICAL RESULTS UG/KG

N	PETROLEUM PRODUCT
2000JN	TETRAHYDRODIMETHYL(METHYLETHYL)NAPHTHALENE
	DECAHYDROMETHYLMETHYLENE(METHYLETHYL)-
1000JN	NAPHTHALENOL
500JN	HEXADECANOIC ACID
300JN	BENZOFLUORENE
20000J	5 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51656  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON            **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO             ST: FL                   **
**   STATION ID: SW-06                                                COLLECTION START: 10/17/90  1440   STOP: 00/00/00   **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y157               MD NO: Y157              **
**                                                                                                                        **
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ANALYTICAL RESULTS UG/L

100J   3 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-04 COLLECTION START: 10/18/90 1020 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y173 MD NO: Y173 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

3000J 2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51666  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO               ST: FL                 **
**   STATION ID: SS-05                                               COLLECTION START: 10/18/90  0900   STOP: 00/00/00   **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y170                MD NO: Y170             **
**                                                                                                                        **
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ANALYTICAL RESULTS UG/KG

5000J	4 UNIDENTIFIED COMPOUNDS
N	PETROLEUM PRODUCT

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51667 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-07 COLLECTION START: 10/17/90 1150 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y153 MD NO: Y153 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

1000J	1 UNIDENTIFIED COMPOUND
2000JN	DODECANOIC ACID
4000JN	HEXADECANOIC ACID

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SS-06	COLLECTION START: 10/17/90 1205 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:	D. NO.: Y152 MD NO: Y152

ANALYTICAL RESULTS UG/KG

2000J 2 UNIDENTIFIED COMPOUNDS

FOOTNOTES

*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-12 COLLECTION START: 10/17/90 1230 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y154 MD NO: Y154 **
** **

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ANALYTICAL RESULTS UG/KG

1000JN	HEXADECANOIC ACID
3000J	2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51670  SAMPLE TYPE:           PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE:                                                        CITY: PALMETTO             ST: FL                  **
**   STATION ID: SB-06                                              COLLECTION START: 10/17/90  1215   STOP: 00/00/00  **
**   CASE.NO.: 15099         SAS NO.:                               D. NO.: Y155               MD NO: Y155             **
**                                                                                                                       **
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ANALYTICAL RESULTS UG/KG

1000J 1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51671  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO                ST: FL                 **
**   STATION ID: SB-03                                                COLLECTION START: 10/17/90  1135   STOP: 00/00/00    **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y149                 MD NO: Y149            **
**                                                                                                                         **
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ANALYTICAL RESULTS UG/KG

2000J   2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51673 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: MW-01 COLLECTION START: 10/16/90 1130 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y326 MD NO: Y326 **
** **
*** ***

ANALYTICAL RESULTS UG/L

10JN DIETHYLMETHYLBENZAMIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-01 COLLECTION START: 10/16/90 1335 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y136 MD NO: Y136 **
** **

*** ***

ANALYTICAL RESULTS UG/KG

2000J	2 UNIDENTIFIED COMPOUNDS
600JN	HEXADECANOIC ACID
300JN	ANTHRACENEDIONE
300JN	BENZOFLUORENE
200JN	BENZOFLUORANTHENE (NOT B OR K)
500JN	BENZACEPHENANTHRYLENE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y329 MD NO: Y329 **
** **
*** ***

ANALYTICAL RESULTS UG/L

6JN	OCTANOIC ACID
5JN	DECANOIC ACID
30JN	BIS(HYDROXYETHYL)DODECANAMIDE
10JN	BUTYLIDENEBISDIMETHYLETHYLMETHYLPHENOL
100J	3 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51678 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-02 COLLECTION START: 10/16/90 1420 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y140 MD NO: Y140 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

50000J	15 UNIDENTIFIED COMPOUNDS
N	PETROLEUM PRODUCT
1000JN	HEXADECANOIC ACID

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51679  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO             ST: FL                 **
**   STATION ID: MW-04                                               COLLECTION START: 10/16/90  1520   STOP: 00/00/00 **
**   CASE.NO.: 15099        SAS NO.:                                 D. NO.: Y327               MD NO: Y327            **
**                                                                                                                     **
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ANALYTICAL RESULTS UG/L

100JN	CAPROLACTAM
20JN	BUTYLIDENBISDIMETHYLETHYLMETHYLPHENOL
20J	1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51680  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON               **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO             ST: FL                     **
**   STATION ID: SS-01                                                COLLECTION START: 10/16/90  1520   STOP: 00/00/00     **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y138                MD NO: Y138               **
**                                                                                                                          **
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ANALYTICAL RESULTS UG/KG

8000J 5 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51682 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-06 COLLECTION START: 10/16/90 1615 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y143 MD NO: Y143

ANALYTICAL RESULTS UG/L

70JN	CAPROLACTAM

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51685  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO          ST: FL                      **
**   STATION ID: SS-02                                               COLLECTION START: 10/17/90  0925   STOP: 00/00/00   **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y144            MD NO: Y144                 **
**                                                                                                                       **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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ANALYTICAL RESULTS UG/KG

N	PETROLEUM PRODUCT
3000J	2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51686  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON               **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO              ST: FL                   **
**   STATION ID: SB-02                                               COLLECTION START: 10/17/90  0945   STOP: 00/00/00    **
**   CASE.NO.: 15099         SAS NO.:                                D. NO.: Y145                MD NO: Y145              **
**                                                                                                                        **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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ANALYTICAL RESULTS UG/KG

800J   1 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: MW-03 COLLECTION START: 10/17/90 0900 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y328 MD NO: Y328 **
** **
*** ***

ANALYTICAL RESULTS UG/L

20JN	BUTYLIDENEBISDIMETHYLETHYLMETHYLPHENOL
5JN	OCTANOIC ACID

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-10 COLLECTION START: 10/17/90 1045 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y150 MD NO: Y150

ANALYTICAL RESULTS UG/KG

30000J	4 UNIDENTIFIED COMPOUNDS
3000JN	PHENYLETHANONE
20000JN	DODECANOIC ACID
700JN	TETRADECANOIC ACID
20000JN	HEXADECANOIC ACID
2000JN	PHENYLTRICYCLONONADIENOL
6000JN	DIPHENYLPROPANEDIONE
4000JN	OCTADECANOIC ACID

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51689  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON           **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO             ST: FL                  **
**   STATION ID: SS-03                                                COLLECTION START: 10/17/90  1020   STOP: 00/00/00  **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y148               MD NO: Y148             **
**                                                                                                                       **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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ANALYTICAL RESULTS UG/KG

8000J   6 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

SISB/SAS
RECEIVED
JAN 22 1991
EPA - REGION IV
ATLANTA GA

*****MEMORANDUM******

DATE: 01/05/91

SUBJECT: Results of Pesticide/PCB Analysis;
91-025 AMAX PHOSPHATE FACIL
PALMETTO FL
CASE NO: 15099

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

ORGANIC DATA QUALIFIER REPORT

Case Number 15099 Project Number 91-025 SAS Number

Site ID. Amax Phosphate Facil, Palmetto, FL.

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
DY143,157,158,161, 163,165,167,169, 172,175,327-329	2-butanone	R	low response factor
DY158	carbon disulfide	J	<quantitation limit
Extractables			
all samples	di-n-butylphthalate	J	low QC spike recovery
	benzo(a)anthracene	J	low QC spike recovery
DY146	all positives	J	<quantitation limit
Pesticides			
none			

ORGANIC DATA QUALIFIER REPORT

Case Number 15099 Project Number 91-025 SAS Number

Site ID. Amax Phosphate Facil, Palmetto, FL.

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
DY173,170,152,155, 140,138,144	all positives	J	<quantitation limit
Extractables			
all samples	bis(2-chloroisopropyl)ether	R	unacceptable recovery blind spike
	nitrobenzene	R	unacceptable recovery blind spike
	1,2,4-trichlorobenzene	R	unacceptable recovery blind spike
	2-chloronaphthalene	R	unacceptable recovery blind spike
	3-nitroaniline	R	unacceptable recovery blind spike
DY168,160,136	phenanthrene	J	<quantitation limit
DY168,136	pyrene	J	<quantitation limit
DY168,160,136	benzo(a)anthracene	J	<quantitation limit
	chrysene	J	<quantitation limit
	benzo(b)fluoranthene	J	<quantitation limit
	benzo(a)pyrene	J	<quantitation limit
DY164,159,170,153	all positives	J	<quantitation limit
DY160	acenaphthene	J	<quantitation limit
DY160,136	anthracene	J	<quantitation limit
	indeno(1,2,3-cd)pyrene	J	<quantitation limit
DY136	benzo(g,h,i)perylene	J	<quantitation limit
DY150	benzoic acid	J	<quantitation limit
DY160	acenaphthene	J	low response factor but present
DY156,159,162,164, 166,168,170,171, 173,174	acenaphthene	R	low response factor
Pesticides			
DY144	alpha-Chlordane	J	<quantitation limit
	gamma-Chlordane	J	<quantitation limit

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51642 SAMPLE TYPE: GROUNDWA
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: PB-01
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 0630 STOP: 00/00/00
D. NUMBER: Y325

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4'-DDD (P,P'-DDD)
0.30U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-05
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/15/90 1655 STOP: 00/00/00
D. NUMBER: Y168

UG/KG	ANALYTICAL RESULTS
21U	ALPHA-BHC
21U	BETA-BHC
21U	DELTA-BHC
21U	GAMMA-BHC (LINDANE)
30U	HEPTACHLOR
21U	ALDRIN
21U	HEPTACHLOR EPOXIDE
21U	ENDOSULFAN I (ALPHA)
43U	DIELDRIN
43U	4,4'-DDE (P,P'-DDE)
43U	ENDRIN
43U	ENDOSULFAN II (BETA)
43U	4,4'-DDD (P,P'-DDD)
43U	ENDOSULFAN SULFATE
43U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
210U	METHOXYCHLOR
43U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
210U	GAMMA-CHLORDANE /2
210U	ALPHA-CHLORDANE /2
430U	TOXAPHENE
210U	PCB-1016 (AROCLOR 1016)
210U	PCB-1221 (AROCLOR 1221)
210U	PCB-1232 (AROCLOR 1232)
210U	PCB-1242 (AROCLOR 1242)
210U	PCB-1248 (AROCLOR 1248)
430U	PCB-1254 (AROCLOR 1254)
430U	PCB-1260 (AROCLOR 1260)
25	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51644 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-05 COLLECTION START: 10/17/90 1645 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y169

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PESTICIDES/PCB'S DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51645 SAMPLE TYPE: PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: CITY: PALMETTO ST: FL **
** STATION ID: SD-04 COLLECTION START: 10/17/90 1630 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y166 **
** **
*** ***

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
40U	DIELDRIN
40U	4,4'-DDE (P,P'-DDE)
40U	ENDRIN
40U	ENDOSULFAN II (BETA)
40U	4,4'-DDD (P,P'-DDD)
40U	ENDOSULFAN SULFATE
40U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
40U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
400U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
400U	PCB-1254 (AROCLOR 1254)
400U	PCB-1260 (AROCLOR 1260)
19	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51646 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-04 COLLECTION START: 10/17/90 1620 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y167

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4'-DDD (P,P'-DDD)
0.20U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51647   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-08   COLLECTION START: 10/17/90 1605   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y165

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4'-DDD (P,P'-DDD)
0.20U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51648 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-08
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1610 STOP: 00/00/00
D. NUMBER: Y164

UG/KG	ANALYTICAL RESULTS
24U	ALPHA-BHC
24U	BETA-BHC
24U	DELTA-BHC
24U	GAMMA-BHC (LINDANE)
40U	HEPTACHLOR
24U	ALDRIN
24U	HEPTACHLOR EPOXIDE
24U	ENDOSULFAN I (ALPHA)
47U	DIELDRIN
47U	4,4'-DDE (P,P'-DDE)
47U	ENDRIN
47U	ENDOSULFAN II (BETA)
47U	4,4'-DDD (P,P'-DDD)
47U	ENDOSULFAN SULFATE
47U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
240U	METHOXYCHLOR
47U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
240U	GAMMA-CHLORDANE /2
240U	ALPHA-CHLORDANE /2
470U	TOXAPHENE
240U	PCB-1016 (AROCLOR 1016)
240U	PCB-1221 (AROCLOR 1221)
240U	PCB-1232 (AROCLOR 1232)
240U	PCB-1242 (AROCLOR 1242)
350	PCB-1248 (AROCLOR 1248)
470U	PCB-1254 (AROCLOR 1254)
470U	PCB-1260 (AROCLOR 1260)
32	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-11 COLLECTION START: 10/17/90 1505 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y159 **
** **
*** ***

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
33U	ALPHA-BHC	330U	METHOXYCHLOR
33U	BETA-BHC	67U	ENDRIN KETONE
33U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
33U	GAMMA-BHC (LINDANE)	330U	GAMMA-CHLORDANE /2
40U	HEPTACHLOR	330U	ALPHA-CHLORDANE /2
33U	ALDRIN	670U	TOXAPHENE
33U	HEPTACHLOR EPOXIDE	330U	PCB-1016 (AROCLOR 1016)
33U	ENDOSULFAN I (ALPHA)	330U	PCB-1221 (AROCLOR 1221)
67U	DIELDRIN	330U	PCB-1232 (AROCLOR 1232)
67U	4,4'-DDE (P,P'-DDE)	330U	PCB-1242 (AROCLOR 1242)
67U	ENDRIN	330U	PCB-1248 (AROCLOR 1248)
67U	ENDOSULFAN II (BETA)	670U	PCB-1254 (AROCLOR 1254)
67U	4,4'-DDD (P,P'-DDD)	670U	PCB-1260 (AROCLOR 1260)
67U	ENDOSULFAN SULFATE	52	PERCENT MOISTURE
67U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y158

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.60U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51651   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-09   COLLECTION START: 10/17/90 1515   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y163

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-09 COLLECTION START: 10/17/90 1530 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y162 **
** **
*** ***

UG/KG	ANALYTICAL RESULTS
27U	ALPHA-BHC
27U	BETA-BHC
27U	DELTA-BHC
27U	GAMMA-BHC (LINDANE)
50U	HEPTACHLOR
27U	ALDRIN
27U	HEPTACHLOR EPOXIDE
27U	ENDOSULFAN I (ALPHA)
53U	DIELDRIN
53U	4,4'-DDE (P,P'-DDE)
53U	ENDRIN
53U	ENDOSULFAN II (BETA)
53U	4,4'-DDD (P,P'-DDD)
53U	ENDOSULFAN SULFATE
53U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
270U	METHOXYCHLOR
53U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
270U	GAMMA-CHLORDANE /2
270U	ALPHA-CHLORDANE /2
530U	TOXAPHENE
270U	PCB-1016 (AROCLOR 1016)
270U	PCB-1221 (AROCLOR 1221)
270U	PCB-1232 (AROCLOR 1232)
270U	PCB-1242 (AROCLOR 1242)
270U	PCB-1248 (AROCLOR 1248)
530U	PCB-1254 (AROCLOR 1254)
530U	PCB-1260 (AROCLOR 1260)
40	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-07
COLLECTION START: 10/17/90 1520 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
D. NUMBER: Y160

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
21U	ALPHA-BHC	210U	METHOXYCHLOR
21U	BETA-BHC	43U	ENDRIN KETONE
21U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
21U	GAMMA-BHC (LINDANE)	210U	GAMMA-CHLORDANE /2
40U	HEPTACHLOR	210U	ALPHA-CHLORDANE /2
21U	ALDRIN	430U	TOXAPHENE
21U	HEPTACHLOR EPOXIDE	210U	PCB-1016 (AROCLOR 1016)
21U	ENDOSULFAN I (ALPHA)	210U	PCB-1221 (AROCLOR 1221)
43U	DIELDRIN	210U	PCB-1232 (AROCLOR 1232)
43U	4,4'-DDE (P,P'-DDE)	210U	PCB-1242 (AROCLOR 1242)
43U	ENDRIN	210U	PCB-1248 (AROCLOR 1248)
43U	ENDOSULFAN II (BETA)	430U	PCB-1254 (AROCLOR 1254)
43U	4,4'-DDD (P,P'-DDD)	430U	PCB-1260 (AROCLOR 1260)
43U	ENDOSULFAN SULFATE	25	PERCENT MOISTURE
43U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51654 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-07 COLLECTION START: 10/17/90 1515 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y161

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51655 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-06
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1445 STOP: 00/00/00
D. NUMBER: Y156

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC	200U	METHOXYCHLOR
20U	BETA-BHC	39U	ENDRIN KETONE
20U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
20U	GAMMA-BHC (LINDANE)	200U	GAMMA-CHLORDANE /2
20U	HEPTACHLOR	200U	ALPHA-CHLORDANE /2
20U	ALDRIN	390U	TOXAPHENE
20U	HEPTACHLOR EPOXIDE	200U	PCB-1016 (AROCLOR 1016)
20U	ENDOSULFAN I (ALPHA)	200U	PCB-1221 (AROCLOR 1221)
39U	DIELDRIN	200U	PCB-1232 (AROCLOR 1232)
39U	4,4'-DDE (P,P'-DDE)	200U	PCB-1242 (AROCLOR 1242)
39U	ENDRIN	200U	PCB-1248 (AROCLOR 1248)
39U	ENDOSULFAN II (BETA)	390U	PCB-1254 (AROCLOR 1254)
39U	4,4'-DDD (P,P'-DDD)	390U	PCB-1260 (AROCLOR 1260)
39U	ENDOSULFAN SULFATE	18	PERCENT MOISTURE
39U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51656 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-06 COLLECTION START: 10/17/90 1440 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y157

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51661 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-04
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 1030 STOP: 00/00/00
D. NUMBER: Y174

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
30U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
39U	DIELDRIN
39U	4,4'-DDE (P,P'-DDE)
39U	ENDRIN
39U	ENDOSULFAN II (BETA)
39U	4,4'-DDD (P,P'-DDD)
39U	ENDOSULFAN SULFATE
39U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
39U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
390U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
390U	PCB-1254 (AROCLOR 1254)
390U	PCB-1260 (AROCLOR 1260)
18	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51662   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: TW-04   COLLECTION START: 10/18/90 1040   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y175

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.10U	ALPHA-BHC	1.0U	METHOXYCHLOR
0.10U	BETA-BHC	0.20U	ENDRIN KETONE
0.10U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.10U	GAMMA-BHC (LINDANE)	1.0U	GAMMA-CHLORDANE /2
0.10U	HEPTACHLOR	1.0U	ALPHA-CHLORDANE /2
0.10U	ALDRIN	2.0U	TOXAPHENE
0.10U	HEPTACHLOR EPOXIDE	1.0U	PCB-1016 (AROCLOR 1016)
0.10U	ENDOSULFAN I (ALPHA)	1.0U	PCB-1221 (AROCLOR 1221)
0.20U	DIELDRIN	1.0U	PCB-1232 (AROCLOR 1232)
0.20U	4,4'-DDE (P,P'-DDE)	1.0U	PCB-1242 (AROCLOR 1242)
0.20U	ENDRIN	1.0U	PCB-1248 (AROCLOR 1248)
0.20U	ENDOSULFAN II (BETA)	2.0U	PCB-1254 (AROCLOR 1254)
0.20U	4,4'-DDD (P,P'-DDD)	2.0U	PCB-1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.20U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-04 COLLECTION START: 10/18/90 1020 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y173

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
21U	ALPHA-BHC	210U	METHOXYCHLOR
21U	BETA-BHC	42U	ENDRIN KETONE
21U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
21U	GAMMA-BHC (LINDANE)	210U	GAMMA-CHLORDANE /2
21U	HEPTACHLOR	210U	ALPHA-CHLORDANE /2
21U	ALDRIN	420U	TOXAPHENE
21U	HEPTACHLOR EPOXIDE	210U	PCB-1016 (AROCLOR 1016)
21U	ENDOSULFAN I (ALPHA)	210U	PCB-1221 (AROCLOR 1221)
42U	DIELDRIN	210U	PCB-1232 (AROCLOR 1232)
42U	4,4'-DDE (P,P'-DDE)	210U	PCB-1242 (AROCLOR 1242)
42U	ENDRIN	210U	PCB-1248 (AROCLOR 1248)
42U	ENDOSULFAN II (BETA)	420U	PCB-1254 (AROCLOR 1254)
42U	4,4'-DDD (P,P'-DDD)	420U	PCB-1260 (AROCLOR 1260)
42U	ENDOSULFAN SULFATE	24	PERCENT MOISTURE
42U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51664 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-05 COLLECTION START: 10/18/90 0930 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y172

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.30U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51665   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SB-05   COLLECTION START: 10/18/90 0910   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y171

UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC
19U	BETA-BHC
19U	DELTA-BHC
19U	GAMMA-BHC (LINDANE)
19U	HEPTACHLOR
19U	ALDRIN
19U	HEPTACHLOR EPOXIDE
19U	ENDOSULFAN I (ALPHA)
38U	DIELDRIN
38U	4,4'-DDE (P,P'-DDE)
38U	ENDRIN
38U	ENDOSULFAN II (BETA)
38U	4,4'-DDD (P,P'-DDD)
38U	ENDOSULFAN SULFATE
38U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
190U	METHOXYCHLOR
38U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
190U	GAMMA-CHLORDANE /2
190U	ALPHA-CHLORDANE /2
380U	TOXAPHENE
190U	PCB-1016 (AROCLOR 1016)
190U	PCB-1221 (AROCLOR 1221)
190U	PCB-1232 (AROCLOR 1232)
190U	PCB-1242 (AROCLOR 1242)
190U	PCB-1248 (AROCLOR 1248)
380U	PCB-1254 (AROCLOR 1254)
380U	PCB-1260 (AROCLOR 1260)
16	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-05
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 0900 STOP: 00/00/00
D. NUMBER: Y170

UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC
19U	BETA-BHC
19U	DELTA-BHC
19U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
19U	ALDRIN
19U	HEPTACHLOR EPOXIDE
19U	ENDOSULFAN I (ALPHA)
37U	DIELDRIN
37U	4,4'-DDE (P,P'-DDE)
37U	ENDRIN
37U	ENDOSULFAN II (BETA)
37U	4,4'-DDD (P,P'-DDD)
37U	ENDOSULFAN SULFATE
37U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
190U	METHOXYCHLOR
37U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
190U	GAMMA-CHLORDANE /2
190U	ALPHA-CHLORDANE /2
370U	TOXAPHENE
190U	PCB-1016 (AROCLOR 1016)
190U	PCB-1221 (AROCLOR 1221)
190U	PCB-1232 (AROCLOR 1232)
190U	PCB-1242 (AROCLOR 1242)
190U	PCB-1248 (AROCLOR 1248)
370U	PCB-1254 (AROCLOR 1254)
370U	PCB-1260 (AROCLOR 1260)
14	PERCENT MOISTURE

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51667 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-07 COLLECTION START: 10/17/90 1150 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y153 **
** **
*** ***

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC	190U	METHOXYCHLOR
19U	BETA-BHC	39U	ENDRIN KETONE
19U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
19U	GAMMA-BHC (LINDANE)	190U	GAMMA-CHLORDANE /2
19U	HEPTACHLOR	190U	ALPHA-CHLORDANE /2
19U	ALDRIN	390U	TOXAPHENE
19U	HEPTACHLOR EPOXIDE	190U	PCB-1016 (AROCLOR 1016)
19U	ENDOSULFAN I (ALPHA)	190U	PCB-1221 (AROCLOR 1221)
39U	DIELDRIN	190U	PCB-1232 (AROCLOR 1232)
39U	4,4'-DDE (P,P'-DDE)	190U	PCB-1242 (AROCLOR 1242)
39U	ENDRIN	190U	PCB-1248 (AROCLOR 1248)
39U	ENDOSULFAN II (BETA)	390U	PCB-1254 (AROCLOR 1254)
39U	4,4'-DDD (P,P'-DDD)	390U	PCB-1260 (AROCLOR 1260)
39U	ENDOSULFAN SULFATE	17	PERCENT MOISTURE
39U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PESTICIDES/PCB'S DATA REPORT — 01/04/91

PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SS-06
COLLECTION START: 10/17/90 1205 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
D. NUMBER: Y152

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC	200U	METHOXYCHLOR
20U	BETA-BHC	40U	ENDRIN KETONE
20U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
20U	GAMMA-BHC (LINDANE)	200U	GAMMA-CHLORDANE /2
20U	HEPTACHLOR	200U	ALPHA-CHLORDANE /2
20U	ALDRIN	400U	TOXAPHENE
20U	HEPTACHLOR EPOXIDE	200U	PCB-1016 (AROCLOR 1016)
20U	ENDOSULFAN I (ALPHA)	200U	PCB-1221 (AROCLOR 1221)
40U	DIELDRIN	200U	PCB-1232 (AROCLOR 1232)
40U	4,4'-DDE (P,P'-DDE)	200U	PCB-1242 (AROCLOR 1242)
40U	ENDRIN	200U	PCB-1248 (AROCLOR 1248)
40U	ENDOSULFAN II (BETA)	400U	PCB-1254 (AROCLOR 1254)
40U	4,4'-DDD (P,P'-DDD)	400U	PCB-1260 (AROCLOR 1260)
40U	ENDOSULFAN SULFATE	20	PERCENT MOISTURE
40U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-12
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1230 STOP: 00/00/00
D. NUMBER: Y154

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
24U	ALPHA-BHC	240U	METHOXYCHLOR
24U	BETA-BHC	47U	ENDRIN KETONE
24U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
24U	GAMMA-BHC (LINDANE)	240U	GAMMA-CHLORDANE /2
24U	HEPTACHLOR	240U	ALPHA-CHLORDANE /2
24U	ALDRIN	470U	TOXAPHENE
24U	HEPTACHLOR EPOXIDE	240U	PCB-1016 (AROCLOR 1016)
24U	ENDOSULFAN I (ALPHA)	240U	PCB-1221 (AROCLOR 1221)
47U	DIELDRIN	240U	PCB-1232 (AROCLOR 1232)
47U	4,4'-DDE (P,P'-DDE)	240U	PCB-1242 (AROCLOR 1242)
47U	ENDRIN	240U	PCB-1248 (AROCLOR 1248)
47U	ENDOSULFAN II (BETA)	470U	PCB-1254 (AROCLOR 1254)
47U	4,4'-DDD (P,P'-DDD)	470U	PCB-1260 (AROCLOR 1260)
47U	ENDOSULFAN SULFATE	32	PERCENT MOISTURE
47U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE: PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: CITY: PALMETTO ST: FL
STATION ID: SB-06 COLLECTION START: 10/17/90 1215 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y155

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC	190U	METHOXYCHLOR
19U	BETA-BHC	38U	ENDRIN KETONE
19U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
19U	GAMMA-BHC (LINDANE)	190U	GAMMA-CHLORDANE /2
19U	HEPTACHLOR	190U	ALPHA-CHLORDANE /2
19U	ALDRIN	380U	TOXAPHENE
19U	HEPTACHLOR EPOXIDE	190U	PCB-1016 (AROCLOR 1016)
19U	ENDOSULFAN I (ALPHA)	190U	PCB-1221 (AROCLOR 1221)
38U	DIELDRIN	190U	PCB-1232 (AROCLOR 1232)
38U	4,4'-DDE (P,P'-DDE)	190U	PCB-1242 (AROCLOR 1242)
38U	ENDRIN	190U	PCB-1248 (AROCLOR 1248)
38U	ENDOSULFAN II (BETA)	380U	PCB-1254 (AROCLOR 1254)
38U	4,4'-DDD (P,P'-DDD)	380U	PCB-1260 (AROCLOR 1260)
38U	ENDOSULFAN SULFATE	16	PERCENT MOISTURE
38U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51671 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-03
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1135 STOP: 00/00/00
D. NUMBER: Y149

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
40U	DIELDRIN
40U	4,4'-DDE (P,P'-DDE)
40U	ENDRIN
40U	ENDOSULFAN II (BETA)
40U	4,4'-DDD (P,P'-DDD)
40U	ENDOSULFAN SULFATE
40U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
40U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
400U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
400U	PCB-1254 (AROCLOR 1254)
400U	PCB-1260 (AROCLOR 1260)
19	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51672   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: TW-03   COLLECTION START: 10/17/90 1145   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y151

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS   ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51673 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-01 COLLECTION START: 10/16/90 1130 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y326

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51674 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-01 COLLECTION START: 10/16/90 1330 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y137

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4'-DDD (P,P'-DDD)
0.24	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
01/04/91

PESTICIDES/PCB'S DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51675 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-01 COLLECTION START: 10/16/90 1335 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y136 **
** **
*** ***

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
41U	DIELDRIN
41U	4,4'-DDE (P,P'-DDE)
41U	ENDRIN
41U	ENDOSULFAN II (BETA)
41U	4,4'-DDD (P,P'-DDD)
41U	ENDOSULFAN SULFATE
41U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
41U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
410U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
410U	PCB-1254 (AROCLOR 1254)
410U	PCB-1260 (AROCLOR 1260)
21	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y329

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PESTICIDES/PCB'S DATA REPORT

** PROJECT NO. 91-025 SAMPLE NO. 51677 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-02 COLLECTION START: 10/16/90 1415 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y141 **

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51678   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-02   COLLECTION START: 10/16/90 1420   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: D. NUMBER: Y140

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
50U	ALPHA-BHC	500U	METHOXYCHLOR
50U	BETA-BHC	100U	ENDRIN KETONE
50U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
50U	GAMMA-BHC (LINDANE)	500U	GAMMA-CHLORDANE /2
50U	HEPTACHLOR	500U	ALPHA-CHLORDANE /2
50U	ALDRIN	1000U	TOXAPHENE
50U	HEPTACHLOR EPOXIDE	500U	PCB-1016 (AROCLOR 1016)
50U	ENDOSULFAN I (ALPHA)	500U	PCB-1221 (AROCLOR 1221)
100U	DIELDRIN	500U	PCB-1232 (AROCLOR 1232)
100U	4,4'-DDE (P,P'-DDE)	500U	PCB-1242 (AROCLOR 1242)
100U	ENDRIN	500U	PCB-1248 (AROCLOR 1248)
100U	ENDOSULFAN II (BETA)	1000U	PCB-1254 (AROCLOR 1254)
100U	4,4'-DDD (P,P'-DDD)	1000U	PCB-1260 (AROCLOR 1260)
100U	ENDOSULFAN SULFATE	68	PERCENT MOISTURE
100U	4,4'-DDT (P,P'-DDT)		

REMARKS   ***REMARKS***

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51679 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-04 COLLECTION START: 10/16/90 1520 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y327

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4'-DDD (P,P'-DDD)
0.30U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51680 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-01
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1520 STOP: 00/00/00
D. NUMBER: Y138

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
22U	ALPHA-BHC	220U	METHOXYCHLOR
22U	BETA-BHC	43U	ENDRIN KETONE
22U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
22U	GAMMA-BHC (LINDANE)	220U	GAMMA-CHLORDANE /2
22U	HEPTACHLOR	220U	ALPHA-CHLORDANE /2
22U	ALDRIN	430U	TOXAPHENE
22U	HEPTACHLOR EPOXIDE	220U	PCB-1016 (AROCLOR 1016)
22U	ENDOSULFAN I (ALPHA)	220U	PCB-1221 (AROCLOR 1221)
43U	DIELDRIN	220U	PCB-1232 (AROCLOR 1232)
43U	4,4'-DDE (P,P'-DDE)	220U	PCB-1242 (AROCLOR 1242)
43U	ENDRIN	220U	PCB-1248 (AROCLOR 1248)
43U	ENDOSULFAN II (BETA)	430U	PCB-1254 (AROCLOR 1254)
43U	4,4'-DDD (P,P'-DDD)	430U	PCB-1260 (AROCLOR 1260)
43U	ENDOSULFAN SULFATE	26	PERCENT MOISTURE
43U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51681 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-01
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/16/90 1535 STOP: 00/00/00
D. NUMBER: Y139

UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC
20U	BETA-BHC
20U	DELTA-BHC
20U	GAMMA-BHC (LINDANE)
20U	HEPTACHLOR
20U	ALDRIN
20U	HEPTACHLOR EPOXIDE
20U	ENDOSULFAN I (ALPHA)
39U	DIELDRIN
39U	4,4'-DDE (P,P'-DDE)
39U	ENDRIN
39U	ENDOSULFAN II (BETA)
39U	4,4'-DDD (P,P'-DDD)
39U	ENDOSULFAN SULFATE
39U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
200U	METHOXYCHLOR
39U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
200U	GAMMA-CHLORDANE /2
200U	ALPHA-CHLORDANE /2
390U	TOXAPHENE
200U	PCB-1016 (AROCLOR 1016)
200U	PCB-1221 (AROCLOR 1221)
200U	PCB-1232 (AROCLOR 1232)
200U	PCB-1242 (AROCLOR 1242)
200U	PCB-1248 (AROCLOR 1248)
390U	PCB-1254 (AROCLOR 1254)
390U	PCB-1260 (AROCLOR 1260)
18	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51682 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: MW-06 COLLECTION START: 10/16/90 1615 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y143 **
** **

*** ***

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4'-DDD (P,P'-DDD)
0.10U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51683 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-01 COLLECTION START: 10/16/90 1625 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y142

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.10U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51684 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PW-01 COLLECTION START: 10/17/90 0935 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y147

UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC
0.050U	BETA-BHC
0.050U	DELTA-BHC
0.050U	GAMMA-BHC (LINDANE)
0.050U	HEPTACHLOR
0.050U	ALDRIN
0.050U	HEPTACHLOR EPOXIDE
0.050U	ENDOSULFAN I (ALPHA)
0.10U	DIELDRIN
0.10U	4,4'-DDE (P,P'-DDE)
0.10U	ENDRIN
0.10U	ENDOSULFAN II (BETA)
0.10U	4,4'-DDD (P,P'-DDD)
0.10U	ENDOSULFAN SULFATE
0.10U	4,4'-DDT (P,P'-DDT)

UG/L	ANALYTICAL RESULTS
0.50U	METHOXYCHLOR
0.10U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
0.50U	GAMMA-CHLORDANE /2
0.50U	ALPHA-CHLORDANE /2
1.0U	TOXAPHENE
0.50U	PCB-1016 (AROCLOR 1016)
0.50U	PCB-1221 (AROCLOR 1221)
0.50U	PCB-1232 (AROCLOR 1232)
0.50U	PCB-1242 (AROCLOR 1242)
0.50U	PCB-1248 (AROCLOR 1248)
1.0U	PCB-1254 (AROCLOR 1254)
1.0U	PCB-1260 (AROCLOR 1260)

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51685 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-02 COLLECTION START: 10/17/90 0925 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y144

UG/KG	ANALYTICAL RESULTS
17U	ALPHA-BHC
17U	BETA-BHC
17U	DELTA-BHC
17U	GAMMA-BHC (LINDANE)
17U	HEPTACHLOR
17U	ALDRIN
17U	HEPTACHLOR EPOXIDE
17U	ENDOSULFAN I (ALPHA)
35U	DIELDRIN
39	4,4'-DDE (P,P'-DDE)
35U	ENDRIN
35U	ENDOSULFAN II (BETA)
35U	4,4'-DDD (P,P'-DDD)
35U	ENDOSULFAN SULFATE
39	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
170U	METHOXYCHLOR
35U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
45J	GAMMA-CHLORDANE /2
52J	ALPHA-CHLORDANE /2
350U	TOXAPHENE
170U	PCB-1016 (AROCLOR 1016)
170U	PCB-1221 (AROCLOR 1221)
170U	PCB-1232 (AROCLOR 1232)
170U	PCB-1242 (AROCLOR 1242)
170U	PCB-1248 (AROCLOR 1248)
350U	PCB-1254 (AROCLOR 1254)
350U	PCB-1260 (AROCLOR 1260)
8	PERCENT MOISTURE

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51686 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-02 COLLECTION START: 10/17/90 0945 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y145

UG/KG	ANALYTICAL RESULTS
19U	ALPHA-BHC
19U	BETA-BHC
19U	DELTA-BHC
19U	GAMMA-BHC (LINDANE)
19U	HEPTACHLOR
19U	ALDRIN
19U	HEPTACHLOR EPOXIDE
19U	ENDOSULFAN I (ALPHA)
38U	DIELDRIN
38U	4,4'-DDE (P,P'-DDE)
38U	ENDRIN
38U	ENDOSULFAN II (BETA)
38U	4,4'-DDD (P,P'-DDD)
38U	ENDOSULFAN SULFATE
38U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
190U	METHOXYCHLOR
38U	ENDRIN KETONE
--	CHLORDANE (TECH. MIXTURE) /1
190U	GAMMA-CHLORDANE /2
190U	ALPHA-CHLORDANE /2
380U	TOXAPHENE
190U	PCB-1016 (AROCLOR 1016)
190U	PCB-1221 (AROCLOR 1221)
190U	PCB-1232 (AROCLOR 1232)
190U	PCB-1242 (AROCLOR 1242)
190U	PCB-1248 (AROCLOR 1248)
380U	PCB-1254 (AROCLOR 1254)
380U	PCB-1260 (AROCLOR 1260)
16	PERCENT MOISTURE

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-03 COLLECTION START: 10/17/90 0900 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y328

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.050U	ALPHA-BHC	0.50U	METHOXYCHLOR
0.050U	BETA-BHC	0.10U	ENDRIN KETONE
0.050U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.050U	GAMMA-BHC (LINDANE)	0.50U	GAMMA-CHLORDANE /2
0.050U	HEPTACHLOR	0.50U	ALPHA-CHLORDANE /2
0.050U	ALDRIN	1.0U	TOXAPHENE
0.050U	HEPTACHLOR EPOXIDE	0.50U	PCB-1016 (AROCLOR 1016)
0.050U	ENDOSULFAN I (ALPHA)	0.50U	PCB-1221 (AROCLOR 1221)
0.10U	DIELDRIN	0.50U	PCB-1232 (AROCLOR 1232)
0.10U	4,4'-DDE (P,P'-DDE)	0.50U	PCB-1242 (AROCLOR 1242)
0.10U	ENDRIN	0.50U	PCB-1248 (AROCLOR 1248)
0.10U	ENDOSULFAN II (BETA)	1.0U	PCB-1254 (AROCLOR 1254)
0.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.10U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-10
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1045 STOP: 00/00/00
D. NUMBER: Y150

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
30U	ALPHA-BHC	300U	METHOXYCHLOR
30U	BETA-BHC	59U	ENDRIN KETONE
30U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
30U	GAMMA-BHC (LINDANE)	300U	GAMMA-CHLORDANE /2
30U	HEPTACHLOR	300U	ALPHA-CHLORDANE /2
30U	ALDRIN	590U	TOXAPHENE
30U	HEPTACHLOR EPOXIDE	300U	PCB-1016 (AROCLOR 1016)
30U	ENDOSULFAN I (ALPHA)	300U	PCB-1221 (AROCLOR 1221)
59U	DIELDRIN	300U	PCB-1232 (AROCLOR 1232)
59U	4,4'-DDE (P,P'-DDE)	300U	PCB-1242 (AROCLOR 1242)
59U	ENDRIN	300U	PCB-1248 (AROCLOR 1248)
59U	ENDOSULFAN II (BETA)	590U	PCB-1254 (AROCLOR 1254)
59U	4,4'-DDD (P,P'-DDD)	590U	PCB-1260 (AROCLOR 1260)
59U	ENDOSULFAN SULFATE	46	PERCENT MOISTURE
59U	4,4'-DDT (P,P'-DDT)		

REMARKS

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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

01/04/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51689 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SS-03
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1020 STOP: 00/00/00
D. NUMBER: Y148

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
20U	ALPHA-BHC	200U	METHOXYCHLOR
20U	BETA-BHC	40U	ENDRIN KETONE
20U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
20U	GAMMA-BHC (LINDANE)	200U	GAMMA-CHLORDANE /2
20U	HEPTACHLOR	200U	ALPHA-CHLORDANE /2
20U	ALDRIN	400U	TOXAPHENE
20U	HEPTACHLOR EPOXIDE	200U	PCB-1016 (AROCLOR 1016)
20U	ENDOSULFAN I (ALPHA)	200U	PCB-1221 (AROCLOR 1221)
40U	DIELDRIN	200U	PCB-1232 (AROCLOR 1232)
40U	4,4'-DDE (P,P'-DDE)	200U	PCB-1242 (AROCLOR 1242)
40U	ENDRIN	200U	PCB-1248 (AROCLOR 1248)
40U	ENDOSULFAN II (BETA)	400U	PCB-1254 (AROCLOR 1254)
40U	4,4'-DDD (P,P'-DDD)	400U	PCB-1260 (AROCLOR 1260)
40U	ENDOSULFAN SULFATE	20	PERCENT MOISTURE
40U	4,4'-DDT (P,P'-DDT)		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PESTICIDES/PCB'S DATA REPORT 01/04/91

** PROJECT NO. 91-025 SAMPLE NO. 51690 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: TW-02 COLLECTION START: 10/17/90 1040 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: D. NUMBER: Y146 **

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
0.10U	ALPHA-BHC	1.0U	METHOXYCHLOR
0.10U	BETA-BHC	0.20U	ENDRIN KETONE
0.10U	DELTA-BHC	--	CHLORDANE (TECH. MIXTURE) /1
0.10U	GAMMA-BHC (LINDANE)	1.0U	GAMMA-CHLORDANE /2
0.10U	HEPTACHLOR	1.0U	ALPHA-CHLORDANE /2
0.10U	ALDRIN	2.0U	TOXAPHENE
0.10U	HEPTACHLOR EPOXIDE	1.0U	PCB-1016 (AROCLOR 1016)
0.10U	ENDOSULFAN I (ALPHA)	1.0U	PCB-1221 (AROCLOR 1221)
0.20U	DIELDRIN	1.0U	PCB-1232 (AROCLOR 1232)
0.20U	4,4'-DDE (P,P'-DDE)	1.0U	PCB-1242 (AROCLOR 1242)
0.20U	ENDRIN	1.0U	PCB-1248 (AROCLOR 1248)
0.20U	ENDOSULFAN II (BETA)	2.0U	PCB-1254 (AROCLOR 1254)
0.20U	4,4'-DDD (P,P'-DDD)	2.0U	PCB-1260 (AROCLOR 1260)
0.20U	ENDOSULFAN SULFATE		
0.20U	4,4'-DDT (P,P'-DDT)		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

Amax Phosphate Facility
FLD043055151

SITE AMAX PHOSPHATE (FIT) STATE FL MANAGER ROGER FRANKLIN (NUS)
PROJECT # 91-025 SHIPWEEK 10/15/90

SOILVOA BOOKED	29	DATA RECEIVED	/ /	FOR		SAMPLES
H2OVOA BOOKED	24	DATA RECEIVED	/ /	FOR		SAMPLES
SOILEXT BOOKED	28	DATA RECEIVED	/ /	FOR		SAMPLES
H2OEXT BOOKED	24	DATA RECEIVED	/ /	FOR		SAMPLES
SOILPEST BOOKED	28	DATA RECEIVED	/ /	FOR		SAMPLES
H2OPEST BOOKED	24	DATA RECEIVED	/ /	FOR		SAMPLES
SOILMET BOOKED	28	DATA RECEIVED	12/10/90	FOR	24	SAMPLES
H2OMET BOOKED	24	DATA RECEIVED	12/10/90	FOR	21	SAMPLES
SOILCN BOOKED	28	DATA RECEIVED	12/10/90	FOR	24	SAMPLES
H2OCN BOOKED	24	DATA RECEIVED	12/10/90	FOR	21	SAMPLES
SOILOTH1 BOOKED	7	DATA RECEIVED	/ /	FOR		SAMPLES
SOILOTH2 BOOKED	0	DATA RECEIVED	/ /	FOR		SAMPLES
H2OOTH1 BOOKED	7	DATA RECEIVED	/ /	FOR		SAMPLES
H2OOTH2 BOOKED	0	DATA RECEIVED	/ /	FOR		SAMPLES
OTHER1 BOOKED	0	DATA RECEIVED	/ /	FOR		SAMPLES
OTHER2 BOOKED	0	DATA RECEIVED	/ /	FOR		SAMPLES

OV REQUESTED? N

LAB(CLP/ESD) clp

SISB/SAS
RECEIVED
DEC 11 1990
EPA - REGION IV
ATLANTA, GA

SISB/SAS
RECEIVED
DEC 11 1990
EPA - REGION IV

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 12/05/90

SUBJECT: Results of Specified Analysis;
91-025 AMAX PHOSPHATE FACIL
PALMETTO FL
CASE NO: 15099

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

INORGANIC DATA QUALIFIERS REPORT

Case Number: 15099
Project Number: 91-025
Site: Amax Phosphate Facil., Palmetto, FL

Element	Flag	Samples Affected	Reason
A. Water			
As, Cd, Pb, Se, V	U	All positives > IDL but < CRDL	Baseline instability
Al, Ba, Ca, Cu, Fe, Mg, Mn, K, Na, Zn	U	All positives > IDL but < 10x contaminant level	Positives in Blanks
Hg	J	All positives	Matrix spike recovery = 154%
Ag	J	All	Matrix spike recovery = 71.3%
Tl	J R	All positives All negatives	Matrix spike recovery = 12.1%
Fe	J	All	Serial dilution percent difference = 17.8%
Hg	J	MDY325	Technical holding time exceeded
CN	J	MDY326-329	Technical holding time exceeded
Zn	J	All positives	Blind spike recovery = 180%
As	J	MDY327-329	Calibration curve r <.995
Se	J	SDG MDY137, and MDY327-329	Calibration curve r <.995
B. Soils			
As, Cd, Pb, Se, V	U	All positives > IDL but < CRDL	Baseline instability
Al, Ba, Ca, Cu, Fe, Mg, Mn, K, Na, Zn	U	All positives > IDL but < 10x contaminant level	Positives in Blanks
As	J R	All positives All negatives	Matrix spike recovery = 0%
Se	J R	All positives All negatives	Matrix spike recovery = 0%
Ag	J	All	Matrix spike recovery = 74.1%
Tl	J	MDY162	Duplicate MSA r <.995
Cu	J	All	Matrix duplicate RPD = 105.2%
Fe	J	All	Matrix duplicate RPD = 42.6%
Pb	J	All	Matrix duplicate RPD = 47.4%
Zn	J	All positives	Blind spike recovery = 180%

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51642  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON        **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO             ST: FL               **
**   STATION ID: PB-01                                                COLLECTION START: 10/15/90  0630   STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y325               MD NO: Y325          **
**                                                                                                                    **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

REMARKS
RECOMMENDED HOLDING TIME EXCEEDED-HG

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-05 COLLECTION START: 10/15/90 1655 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y168 MD NO: Y168 **
** **
*** ***

RESULTS	UNITS	PARAMETER
1.5U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51644 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-05 COLLECTION START: 10/17/90 1645 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y169 MD NO: Y169

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51645  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON                       **
**   SOURCE: AMAX PHOSPHATE FACIL                                      CITY: PALMETTO             ST: FL                              **
**   STATION ID: SD-04                                                 COLLECTION START: 10/17/90  1630   STOP: 00/00/00              **
**   CASE.NO.: 15099          SAS NO.:                                 D. NO.: Y166              MD NO: Y166                          **
**                                                                                                                                    **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51646 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-04 COLLECTION START: 10/17/90 1620 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y167 MD NO: Y167

RESULTS	UNITS	PARAMETER
20U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51647 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-08 COLLECTION START: 10/17/90 1605 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y165 MD NO: Y165 **
** **
*** ***

RESULTS	UNITS	PARAMETER
100	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51648 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-08 COLLECTION START: 10/17/90 1610 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y164 MD NO: Y164

RESULTS	UNITS	PARAMETER
1.5U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51649   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-11   COLLECTION START: 10/17/90 1505   STOP: 00/00/00
CASE.NO.: 15099   SAS NO.:   D. NO.: Y159   MD NO: Y159

RESULTS	UNITS	PARAMETER
2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51650  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON            **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                 **
**   STATION ID: SW-11                                                COLLECTION START: 10/17/90  1445   STOP: 00/00/00  **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y158                MD NO: Y158            **
**                                                                                                                        **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51651  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON               **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO             ST: FL                     **
**   STATION ID: SW-09                                                COLLECTION START: 10/17/90  1515   STOP: 00/00/00     **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y163               MD NO: Y163                **
**                                                                                                                          **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51652 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-09 COLLECTION START: 10/17/90 1530 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y162 MD NO: Y162 **
**
*** ***

RESULTS	UNITS	PARAMETER
2.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51653  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON                   **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                         **
**   STATION ID: SD-07                                                COLLECTION START: 10/17/90  1520   STOP: 00/00/00          **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y160               MD NO: Y160                     **
**                                                                                                                               **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51654  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO             ST: FL                **
**   STATION ID: SW-07                                                COLLECTION START: 10/17/90  1515   STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y161               MD NO: Y161           **
**                                                                                                                     **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
14	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51655 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-06 COLLECTION START: 10/17/90 1445 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y156 MD NO: Y156 **
** **
*** ***

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51656 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-06 COLLECTION START: 10/17/90 1440 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y157 MD NO: Y157 **
** **
*** ***

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51661  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON                   **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                        **
**   STATION ID: SB-04                                                COLLECTION START: 10/18/90  1030   STOP: 00/00/00         **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y174               MD NO: Y174                    **
**                                                                                                                              **
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RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51662 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: TW-04 COLLECTION START: 10/18/90 1040 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y175 MD NO: Y175 **
** **
*** ***

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-04 COLLECTION START: 10/18/90 1020 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y173 MD NO: Y173

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51664  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO            ST: FL                 **
**   STATION ID: TW-05                                                COLLECTION START: 10/18/90  0930   STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y172              MD NO: Y172            **
**                                                                                                                     **
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51665 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SB-05 COLLECTION START: 10/18/90 0910 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y171 MD NO: Y171 **
** **
*** ***

RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***

** PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-05 COLLECTION START: 10/18/90 0900 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y170 MD NO: Y170 **
** **

*** ***

RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51667  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                 **
**   STATION ID: SS-07                                                COLLECTION START: 10/17/90  1150   STOP: 00/00/00  **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y153               MD NO: Y153             **
**                                                                                                                       **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-06 COLLECTION START: 10/17/90 1205 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y152 MD NO: Y152 **
** **
*** ***

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-12 COLLECTION START: 10/17/90 1230 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y154 MD NO: Y154 **
** **
*** ***

RESULTS	UNITS	PARAMETER
1.6U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-06 COLLECTION START: 10/17/90 1215 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y155 MD NO: Y155

RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51671 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SB-03 COLLECTION START: 10/17/90 1135 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y149 MD NO: Y149 **
** **
*** ***

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51672  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON            **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                  **
**   STATION ID: TW-03                                                COLLECTION START: 10/17/90  1145   STOP: 00/00/00   **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y151               MD NO: Y151              **
**                                                                                                                        **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51673   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: MW-01   COLLECTION START: 10/16/90 1130   STOP: 00/00/00
CASE.NO.: 15099   SAS NO.:   D. NO.: Y326   MD NO: Y326

RESULTS	UNITS	PARAMETER
10UJ	UG/L	CYANIDE

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51674  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON           **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                 **
**   STATION ID: SW-01                                                COLLECTION START: 10/16/90  1330   STOP: 00/00/00  **
**   CASE.NO.: 15099         SAS NO.:                                 D. NO.: Y137                MD NO: Y137            **
**                                                                                                                       **
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025	SAMPLE NO. 51675	SAMPLE TYPE: SOIL
PROG ELEM: NSF	COLLECTED BY: M GORDON	
SOURCE: AMAX PHOSPHATE FACIL		
CITY: PALMETTO	ST: FL	
STATION ID: SD-01		
COLLECTION START: 10/16/90 1335	STOP: 00/00/00	
CASE.NO.: 15099	SAS NO.:	
D. NO.: Y136	MD NO: Y136	

RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51676  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO              ST: FL                **
**   STATION ID: MW-05                                               COLLECTION START: 10/16/90  1350   STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y329                MD NO: Y329           **
**                                                                                                                     **
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RESULTS	UNITS	PARAMETER
10UJ	UG/L	CYANIDE

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51677  SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO                ST: FL                  **
**   STATION ID: SW-02                                                COLLECTION START: 10/16/90  1415   STOP: 00/00/00 .   **
**   CASE.NO.: 15099           SAS NO.:                               D. NO.: Y141                 MD NO: Y141              **
**                                                                                                                            **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51678 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SD-02	COLLECTION START: 10/16/90 1420 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.:	D. NO.: Y140 MD NO: Y140

RESULTS	UNITS	PARAMETER
3.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51679  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO              ST: FL                   **
**   STATION ID: MW-04                                                COLLECTION START: 10/16/90  1520   STOP: 00/00/00    **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y327                MD NO: Y327              **
**                                                                                                                         **
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RESULTS	UNITS	PARAMETER
10UJ	UG/L	CYANIDE

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51680 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-01 COLLECTION START: 10/16/90 1520 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y138 MD NO: Y138

RESULTS	UNITS	PARAMETER
1.4U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51681  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON              **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO             ST: FL                    **
**   STATION ID: SB-01                                               COLLECTION START: 10/16/90  1535   STOP: 00/00/00    **
**   CASE.NO.: 15099         SAS NO.:                                D. NO.: Y139               MD NO: Y139               **
**                                                                                                                        **
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RESULTS	UNITS	PARAMETER
1.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51682  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON             **
**   SOURCE: AMAX PHOSPHATE FACIL                                      CITY: PALMETTO              ST: FL                    **
**   STATION ID: MW-06                                                 COLLECTION START: 10/16/90  1615   STOP: 00/00/00     **
**   CASE.NO.: 15099          SAS NO.:                                 D. NO.: Y143                MD NO: Y143               **
**                                                                                                                            **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51683  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON                  **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO             ST: FL                       **
**   STATION ID: TW-01                                               COLLECTION START: 10/16/90  1625   STOP: 00/00/00       **
**   CASE.NO.: 15099         SAS NO.:                                D. NO.: Y142               MD NO: Y142                  **
**                                                                                                                           **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51684 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: PW-01 COLLECTION START: 10/17/90 0935 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y147 MD NO: Y147 **
** **
*** ***

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51685 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-02 COLLECTION START: 10/17/90 0925 STOP: 00/00/00
CASE.NO.: 15099 SAS NO.: D. NO.: Y144 MD NO: Y144

RESULTS	UNITS	PARAMETER
1.1U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51686  SAMPLE TYPE: SOIL       PROG ELEM: NSF   COLLECTED BY: M GORDON           **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO              ST: FL                **
**   STATION ID: SB-02                                               COLLECTION START: 10/17/90  0945   STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y145             MD NO: Y145              **
**                                                                                                                     **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025    SAMPLE NO. 51687  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M GORDON          **
**   SOURCE: AMAX PHOSPHATE FACIL                                     CITY: PALMETTO            ST: FL                  **
**   STATION ID: MW-03                                                COLLECTION START: 10/17/90  0900   STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                                D. NO.: Y328              MD NO: Y328             **
**                                                                                                                      **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
10UJ	UG/L	CYANIDE

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-10 COLLECTION START: 10/17/90 1045 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y150 MD NO: Y150 **
** **
*** ***

RESULTS	UNITS	PARAMETER
1.8U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

SPECIFIED ANALYSIS DATA REPORT

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**   PROJECT NO. 91-025   SAMPLE NO. 51689  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M GORDON        **
**   SOURCE: AMAX PHOSPHATE FACIL                                    CITY: PALMETTO           ST: FL                **
**   STATION ID: SS-03                                               COLLECTION START: 10/17/90  1020  STOP: 00/00/00 **
**   CASE.NO.: 15099          SAS NO.:                               D. NO.: Y148             MD NO: Y148           **
**                                                                                                                  **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
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RESULTS	UNITS	PARAMETER
1.2U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51690 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: TW-02 COLLECTION START: 10/17/90 1040 STOP: 00/00/00 **
** CASE.NO.: 15099 SAS NO.: D. NO.: Y146 MD NO: Y146 **
** **
*** ***

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SISB/SAS
RECEIVED
DEC 1 . 1990
EPA - REGION IV
ATLANTA, GA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 12/05/90

SUBJECT: Results of Metals Analysis;
91-025 AMAX PHOSPHATE FACIL
PALMETTO FL
CASE NO: 15099

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

cc:

INORGANIC DATA QUALIFIERS REPORT

Case Number: 15099
Project Number: 91-025
Site: Amax Phosphate Facil., Palmetto, FL

Element	Flag	Samples Affected	Reason
A. Water			
As, Cd, Pb, Se, V	U	All positives > IDL but < CRDL	Baseline instability
Al, Ba, Ca, Cu, Fe, Mg, Mn, K, Na, Zn	U	All positives > IDL but < 10x contaminant level	Positives in Blanks
Hg	J	All positives	Matrix spike recovery = 154%
Ag	J	All	Matrix spike recovery = 71.3%
Tl	J R	All positives All negatives	Matrix spike recovery = 12.1%
Fe	J	All	Serial dilution percent difference = 17.8%
Hg	J	MDY325	Technical holding time exceeded
CN	J	MDY326-329	Technical holding time exceeded
Zn	J	All positives	Blind spike recovery = 180%
As	J	MDY327-329	Calibration curve r <.995
Se	J	SDG MDY137, and MDY327-329	Calibration curve r <.995
B. Soils			
As, Cd, Pb, Se, V	U	All positives > IDL but < CRDL	Baseline instability
Al, Ba, Ca, Cu, Fe, Mg, Mn, K, Na, Zn	U	All positives > IDL but < 10x contaminant level	Positives in Blanks
As	J R	All positives All negatives	Matrix spike recovery = 0%
Se	J R	All positives All negatives	Matrix spike recovery = 0%
Ag	J	All	Matrix spike recovery = 74.1%
Tl	J	MDY162	Duplicate MSA r <.995
Cu	J	All	Matrix duplicate RPD = 105.2%
Fe	J	All	Matrix duplicate RPD = 42.6%
Pb	J	All	Matrix duplicate RPD = 47.4%
Zn	J	All positives	Blind spike recovery = 180%

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51642 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PB-01 COLLECTION START: 10/15/90 0630 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y325

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
150U	ALUMINUM	2U	MANGANESE
24U	ANTIMONY	0.20UJ	MERCURY
2U	ARSENIC	6U	NICKEL
2U	BARIUM	72U	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
50U	CALCIUM	50U	SODIUM
6U	CHROMIUM	2UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
140UJ	IRON	60U	ZINC
4U	LEAD		
30U	MAGNESIUM		

REMARKS
RECOMMENDED HOLDING TIME EXCEEDED-HG

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

METALS DATA REPORT 12/04/90

PROJECT NO. 91-025 SAMPLE NO. 51643 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-05 COLLECTION START: 10/15/90 1655 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y168

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1300	ALUMINUM	20U	MANGANESE
6.9U	ANTIMONY	0.14U	MERCURY
2UJ	ARSENIC	1.7U	NICKEL
7.5	BARIUM	280U	POTASSIUM
0.29U	BERYLLIUM	0.57UR	SELENIUM
0.86U	CADMIUM	1.4UJ	SILVER
3100	CALCIUM	2900	SODIUM
2.8	CHROMIUM	0.57U	THALLIUM
1.1U	COBALT	NA	TIN
20UJ	COPPER	3U	VANADIUM
1600J	IRON	20UJ	ZINC
74J	LEAD	31	PERCENT MOISTURE
1100	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51644 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-05 COLLECTION START: 10/17/90 1645 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y169 **
**
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
80U	ALUMINUM	50U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
5U	ARSENIC	6U	NICKEL
29	BARIUM	68000	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
160000	CALCIUM	1500000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
4U	COPPER	3U	VANADIUM
240UJ	IRON	40UJ	ZINC
3U	LEAD		
220000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51645 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SD-04
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/17/90 1630 STOP: 00/00/00
MD NUMBER: Y166

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
530	ALUMINUM	5U	MANGANESE
5.6U	ANTIMONY	0.10U	MERCURY
1UJ	ARSENIC	1.4U	NICKEL
19	BARIUM	30U	POTASSIUM
0.23U	BERYLLIUM	0.49UR	SELENIUM
0.70U	CADMIUM	1.2UJ	SILVER
2000	CALCIUM	60U	SODIUM
1.4U	CHROMIUM	0.49U	THALLIUM
0.93U	COBALT	NA	TIN
3UJ	COPPER	1U	VANADIUM
830J	IRON	9UJ	ZINC
1.1J	LEAD	20	PERCENT MOISTURE
82	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51646 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-04 COLLECTION START: 10/17/90 1620 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y167

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
40U	ALUMINUM	20U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
3U	ARSENIC	6U	NICKEL
20U	BARIUM	16000	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
160000	CALCIUM	110000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
5U	COPPER	4U	VANADIUM
170UJ	IRON	50UJ	ZINC
3U	LEAD		
58000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51647 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-08 COLLECTION START: 10/17/90 1605 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y165

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
140U	ALUMINUM	52	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
3U	ARSENIC	6U	NICKEL
20U	BARIUM	6800	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
160000	CALCIUM	69000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
350UJ	IRON	50UJ	ZINC
4U	LEAD		
42000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51648 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-08 COLLECTION START: 10/17/90 1610 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y164 **
** **
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MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
950	ALUMINUM	20U	MANGANESE
7U	ANTIMONY	0.14U	MERCURY
2UJ	ARSENIC	2U	NICKEL
13	BARIUM	50U	POTASSIUM
0.29U	BERYLLIUM	0.59UR	SELENIUM
0.87U	CADMIUM	1.4UJ	SILVER
7200	CALCIUM	160U	SODIUM
6.6	CHROMIUM	0.59U	THALLIUM
1.2U	COBALT	NA	TIN
20UJ	COPPER	4U	VANADIUM
2100J	IRON	40UJ	ZINC
15J	LEAD	33	PERCENT MOISTURE
520	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51649 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-11
COLLECTION START: 10/17/90 1505 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
MD NUMBER: Y159

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
300	ALUMINUM	44	MANGANESE
9.2U	ANTIMONY	0.18U	MERCURY
4UJ	ARSENIC	17	NICKEL
16	BARIUM	290U	POTASSIUM
0.38U	BERYLLIUM	0.82UR	SELENIUM
2U	CADMIUM	1.9UJ	SILVER
220000	CALCIUM	2800	SODIUM
7.1	CHROMIUM	0.82U	THALLIUM
3.9	COBALT	NA	TIN
2UJ	COPPER	5U	VANADIUM
390J	IRON	20UJ	ZINC
2.1J	LEAD	51	PERCENT MOISTURE
4500	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51650 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-11 COLLECTION START: 10/17/90 1445 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y158

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
30U	ALUMINUM	8U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
49	ARSENIC	11U	NICKEL
9U	BARIUM	89000	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
170000	CALCIUM	650000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
60UJ	IRON	40UJ	ZINC
3U	LEAD		
49000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   12/04/90

METALS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51651   SAMPLE TYPE: SURFACEWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SW-09   COLLECTION START: 10/17/90 1515   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: MD NUMBER: Y163

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
27000	ALUMINUM	4100	MANGANESE
50U	ANTIMONY	0.20U	MERCURY
30UJ	ARSENIC	690	NICKEL
63	BARIUM	160000	POTASSIUM
23	BERYLLIUM	20UJ	SELENIUM
130	CADMIUM	5UJ	SILVER
670000	CALCIUM	1200000	SODIUM
360	CHROMIUM	13J	THALLIUM
210	COBALT	NA	TIN
20U	COPPER	820	VANADIUM
29000J	IRON	1400J	ZINC
35	LEAD		
200000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51652   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-09   COLLECTION START: 10/17/90 1530   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: MD NUMBER: Y162

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
21000	ALUMINUM	26	MANGANESE
20U	ANTIMONY	0.17U	MERCURY
2.1UR	ARSENIC	4U	NICKEL
110	BARIUM	2000	POTASSIUM
2U	BERYLLIUM	0.86UR	SELENIUM
2.6	CADMIUM	2.1UJ	SILVER
200000	CALCIUM	12000	SODIUM
140	CHROMIUM	4UJ	THALLIUM
2.7	COBALT	NA	TIN
10UJ	COPPER	140	VANADIUM
45000J	IRON	70UJ	ZINC
85J	LEAD	54	PERCENT MOISTURE
2000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51653 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-07 COLLECTION START: 10/17/90 1520 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y160 **

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MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1000	ALUMINUM	22	MANGANESE
6.2U	ANTIMONY	0.12U	MERCURY
2UJ	ARSENIC	2.7	NICKEL
13	BARIUM	50U	POTASSIUM
0.26U	BERYLLIUM	0.52UR	SELENIUM
0.78U	CADMIUM	1.3UJ	SILVER
27000	CALCIUM	140U	SODIUM
6.1	CHROMIUM	0.52U	THALLIUM
1U	COBALT	NA	TIN
8UJ	COPPER	5U	VANADIUM
6400J	IRON	30UJ	ZINC
11J	LEAD	26	PERCENT MOISTURE
200	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51654 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-07 COLLECTION START: 10/17/90 1515 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y161

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
50U	ALUMINUM	40U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
2U	ARSENIC	6U	NICKEL
20U	BARIUM	5300	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
180000	CALCIUM	100000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
200UJ	IRON	40UJ	ZINC
3U	LEAD		
59000	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

** PROJECT NO. 91-025 SAMPLE NO. 51655 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SD-06 COLLECTION START: 10/17/90 1445 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y156 **

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1100	ALUMINUM	26	MANGANESE
6U	ANTIMONY	0.11U	MERCURY
1UJ	ARSENIC	2.3	NICKEL
5.2	BARIUM	40U	POTASSIUM
0.25U	BERYLLIUM	0.48UR	SELENIUM
0.75U	CADMIUM	1.2UJ	SILVER
8400	CALCIUM	140U	SODIUM
2.4	CHROMIUM	0.48U	THALLIUM
1U	COBALT	NA	TIN
4UJ	COPPER	3U	VANADIUM
9000J	IRON	9UJ	ZINC
1.7J	LEAD	21	PERCENT MOISTURE
170	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

** PROJECT NO. 91-025 SAMPLE NO. 51656 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SW-06 COLLECTION START: 10/17/90 1440 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y157 **

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
150U	ALUMINUM	5U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
2U	ARSENIC	6U	NICKEL
30U	BARIUM	3700	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
150000	CALCIUM	42000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
5U	COPPER	3U	VANADIUM
220UJ	IRON	50UJ	ZINC
2U	LEAD		
66000	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51661 SAMPLE TYPE: SOIL
SOURCE: AMAX PHOSPHATE FACIL
STATION ID: SB-04
CASE NUMBER: 15099 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M GORDON
CITY: PALMETTO ST: FL
COLLECTION START: 10/18/90 1030 STOP: 00/00/00
MD NUMBER: Y174

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1100	ALUMINUM	3U	MANGANESE
7.4U	ANTIMONY	0.11U	MERCURY
2UJ	ARSENIC	1.5U	NICKEL
5.3	BARIUM	33U	POTASSIUM
0.25U	BERYLLIUM	0.73UR	SELENIUM
0.74U	CADMIUM	1.2UJ	SILVER
600	CALCIUM	60U	SODIUM
2U	CHROMIUM	0.49U	THALLIUM
1.7U	COBALT	NA	TIN
3UJ	COPPER	2U	VANADIUM
460	IRON	4UJ	ZINC
1.4J	LEAD	20	PERCENT MOISTURE
60U	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51662 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-04 COLLECTION START: 10/18/90 1040 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y175

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
20000	ALUMINUM	39	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
56	ARSENIC	14	NICKEL
210	BARIUM	8000	POTASSIUM
2U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
320000	CALCIUM	120000	SODIUM
38	CHROMIUM	10UR	THALLIUM
9	COBALT	NA	TIN
3U	COPPER	50U	VANADIUM
25000J	IRON	80UJ	ZINC
12	LEAD		
25000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51663 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-04 COLLECTION START: 10/18/90 1020 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y173 **
** **
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MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1300	ALUMINUM	4U	MANGANESE
7.7U	ANTIMONY	0.12U	MERCURY
2UJ	ARSENIC	1.5U	NICKEL
13	BARIUM	40U	POTASSIUM
0.26U	BERYLLIUM	4.9J	SELENIUM
0.77U	CADMIUM	1.3UJ	SILVER
9200	CALCIUM	190U	SODIUM
3U	CHROMIUM	0.50U	THALLIUM
1.8U	COBALT	NA	TIN
5UJ	COPPER	4U	VANADIUM
2600J	IRON	4UJ	ZINC
8.9U	LEAD	23	PERCENT MOISTURE
260	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51664 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-05 COLLECTION START: 10/18/90 0930 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y172

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
5600	ALUMINUM	10U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
3U	ARSENIC	6U	NICKEL
130	BARIUM	30000	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
470000	CALCIUM	55000	SODIUM
13	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
6U	COPPER	130	VANADIUM
2300J	IRON	60UJ	ZINC
5	LEAD		
39000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51665 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SB-05	COLLECTION START: 10/18/90 0910 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:	MD NUMBER: Y171

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1700	ALUMINUM	5U	MANGANESE
7.2U	ANTIMONY	0.10U	MERCURY
2UJ	ARSENIC	1.4U	NICKEL
5.6	BARIUM	70U	POTASSIUM
0.24U	BERYLLIUM	0.71UR	SELENIUM
0.72U	CADMIUM	1.2UJ	SILVER
6700	CALCIUM	160U	SODIUM
4.1	CHROMIUM	0.47U	THALLIUM
1.7U	COBALT	NA	TIN
6UJ	COPPER	9U	VANADIUM
700J	IRON	5UJ	ZINC
1.3J	LEAD	18	PERCENT MOISTURE
190U	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51666 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-05 COLLECTION START: 10/18/90 0900 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y170 **
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MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
6000	ALUMINUM	95	MANGANESE
6.5U	ANTIMONY	0.11U	MERCURY
2.3UR	ARSENIC	9	NICKEL
55	BARIUM	860	POTASSIUM
1U	BERYLLIUM	3.4UR	SELENIUM
4.4	CADMIUM	1.1UJ	SILVER
190000	CALCIUM	2600	SODIUM
29	CHROMIUM	1U	THALLIUM
2.4	COBALT	NA	TIN
5UJ	COPPER	56	VANADIUM
4300J	IRON	50UJ	ZINC
19J	LEAD	14	PERCENT MOISTURE
1100	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51667 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-07 COLLECTION START: 10/17/90 1150 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y153

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1100	ALUMINUM	25	MANGANESE
5.4U	ANTIMONY	0.10U	MERCURY
3UJ	ARSENIC	3.9	NICKEL
30	BARIUM	240U	POTASSIUM
1U	BERYLLIUM	2.3UR	SELENIUM
1U	CADMIUM	1.1UJ	SILVER
150000	CALCIUM	960	SODIUM
11	CHROMIUM	0.45U	THALLIUM
2U	COBALT	NA	TIN
2UJ	COPPER	13	VANADIUM
1800J	IRON	20UJ	ZINC
8.9J	LEAD	16	PERCENT MOISTURE
190	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

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** PROJECT NO. 91-025 SAMPLE NO. 51668 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SS-06 COLLECTION START: 10/17/90 1205 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y152 **
** **
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MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
8300	ALUMINUM	14	MANGANESE
5.7U	ANTIMONY	0.10U	MERCURY
1.2UR	ARSENIC	3.5	NICKEL
33	BARIUM	820	POTASSIUM
1U	BERYLLIUM	2.4UR	SELENIUM
3	CADMIUM	1.2UJ	SILVER
88000	CALCIUM	2900	SODIUM
42	CHROMIUM	0.48U	THALLIUM
1.5	COBALT	NA	TIN
7UJ	COPPER	42	VANADIUM
7000J	IRON	20UJ	ZINC
25J	LEAD	21	PERCENT MOISTURE
2700	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51669 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-12 COLLECTION START: 10/17/90 1230 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y154

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
12000	ALUMINUM	40	MANGANESE
6.9U	ANTIMONY	0.14U	MERCURY
1.5UR	ARSENIC	7.6	NICKEL
64	BARIUM	1600	POTASSIUM
2U	BERYLLIUM	3.1UR	SELENIUM
8	CADMIUM	1.4UJ	SILVER
110000	CALCIUM	6700	SODIUM
76	CHROMIUM	0.61U	THALLIUM
3.4	COBALT	NA	TIN
8UJ	COPPER	130	VANADIUM
18000J	IRON	70UJ	ZINC
59J	LEAD	36	PERCENT MOISTURE
9900	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51670 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-06 COLLECTION START: 10/17/90 1215 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y155

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
3100	ALUMINUM	7U	MANGANESE
5.3U	ANTIMONY	0.12U	MERCURY
1UJ	ARSENIC	2U	NICKEL
18	BARIUM	180U	POTASSIUM
0.22U	BERYLLIUM	0.47UR	SELENIUM
1U	CADMIUM	1.1UJ	SILVER
63000	CALCIUM	540	SODIUM
5.2	CHROMIUM	0.47U	THALLIUM
0.88U	COBALT	NA	TIN
2UJ	COPPER	6U	VANADIUM
2500J	IRON	5UJ	ZINC
3.3J	LEAD	16	PERCENT MOISTURE
390	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

*** ***
** PROJECT NO. 91-025 SAMPLE NO. 51671 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: SB-03 COLLECTION START: 10/17/90 1135 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y149 **
** **
*** ***

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
2900	ALUMINUM	5U	MANGANESE
5.6U	ANTIMONY	0.12U	MERCURY
1UJ	ARSENIC	1.4U	NICKEL
11	BARIUM	90U	POTASSIUM
0.24U	BERYLLIUM	0.50UR	SELENIUM
0.71U	CADMIUM	1.2UJ	SILVER
42000	CALCIUM	390	SODIUM
6.6	CHROMIUM	0.50U	THALLIUM
0.94U	COBALT	NA	TIN
0.71UJ	COPPER	13	VANADIUM
2700J	IRON	4UJ	ZINC
1.8J	LEAD	22	PERCENT MOISTURE
280	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51672 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-03 COLLECTION START: 10/17/90 1145 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y151

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
7300	ALUMINUM	30U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
18	ARSENIC	6U	NICKEL
53	BARIUM	23000	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
600000	CALCIUM	7000	SODIUM
12	CHROMIUM	2UR	THALLIUM
4U	COBALT	NA	TIN
4U	COPPER	20U	VANADIUM
27000J	IRON	50UJ	ZINC
3U	LEAD		
36000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51673   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: MW-01   COLLECTION START: 10/16/90 1130   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: MD NUMBER: Y326

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
3400	ALUMINUM	73	MANGANESE
30U	ANTIMONY	0.20U	MERCURY
6U	ARSENIC	8U	NICKEL
30U	BARIUM	4000	POTASSIUM
1U	BERYLLIUM	3U	SELENIUM
3U	CADMIUM	5UJ	SILVER
81000	CALCIUM	75000	SODIUM
5U	CHROMIUM	10UR	THALLIUM
7U	COBALT	NA	TIN
7U	COPPER	9U	VANADIUM
3300J	IRON	50UJ	ZINC
5	LEAD		
37000	MAGNESIUM		

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51674 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-01 COLLECTION START: 10/16/90 1330 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y137

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
340U	ALUMINUM	20U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
5U	ARSENIC	6U	NICKEL
20U	BARIUM	47000	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
61000	CALCIUM	1100000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
7U	COPPER	4U	VANADIUM
350UJ	IRON	40UJ	ZINC
5	LEAD		
140000	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025   SAMPLE NO. 51675   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL   CITY: PALMETTO   ST: FL
STATION ID: SD-01   COLLECTION START: 10/16/90 1335   STOP: 00/00/00
CASE NUMBER: 15099   SAS NUMBER: MD NUMBER: Y136

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
380	ALUMINUM	2U	MANGANESE
5.7U	ANTIMONY	0.11U	MERCURY
2UJ	ARSENIC	1.4U	NICKEL
2U	BARIUM	60U	POTASSIUM
0.24U	BERYLLIUM	0.48UR	SELENIUM
0.71U	CADMIUM	1.2UJ	SILVER
1400	CALCIUM	350U	SODIUM
1.4U	CHROMIUM	0.48U	THALLIUM
0.95U	COBALT	NA	TIN
9UJ	COPPER	1U	VANADIUM
440J	IRON	9UJ	ZINC
2.8J	LEAD	22	PERCENT MOISTURE
200	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51676 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-05 COLLECTION START: 10/16/90 1350 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y329

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
1610	ALUMINUM	50U	MANGANESE
30U	ANTIMONY	0.20U	MERCURY
6UJ	ARSENIC	6U	NICKEL
52	BARIUM	9300	POTASSIUM
1U	BERYLLIUM	3UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
270000	CALCIUM	61000	SODIUM
9	CHROMIUM	10UR	THALLIUM
7U	COBALT	NA	TIN
3U	COPPER	20U	VANADIUM
3200J	IRON	50UJ	ZINC
3U	LEAD		
61000	MAGNESIUM		

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51677 SAMPLE TYPE: SURFACEWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SW-02 COLLECTION START: 10/16/90 1415 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y141

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
16000	ALUMINUM	110	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
8U	ARSENIC	8U	NICKEL
120	BARIUM	13000	POTASSIUM
1U	BERYLLIUM	4UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
170000	CALCIUM	68000	SODIUM
28	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
110U	COPPER	30U	VANADIUM
14000J	IRON	130UJ	ZINC
14	LEAD		
46000	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51678 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL
CITY: PALMETTO ST: FL
STATION ID: SD-02
COLLECTION START: 10/16/90 1420 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:
MD NUMBER: Y140

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
10000	ALUMINUM	63	MANGANESE
20U	ANTIMONY	0.26U	MERCURY
5UJ	ARSENIC	6.7	NICKEL
80	BARIUM	270U	POTASSIUM
0.63U	BERYLLIUM	1.2UR	SELENIUM
1.9U	CADMIUM	3.2UJ	SILVER
38000	CALCIUM	290U	SODIUM
20	CHROMIUM	1.2U	THALLIUM
3U	COBALT	NA	TIN
62J	COPPER	20U	VANADIUM
11000J	IRON	70UJ	ZINC
16J	LEAD	69	PERCENT MOISTURE
2500	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51679 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-04 COLLECTION START: 10/16/90 1520 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y327

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
440U	ALUMINUM	8U	MANGANESE
30U	ANTIMONY	0.20U	MERCURY
3UJ	ARSENIC	6U	NICKEL
30U	BARIUM	2600	POTASSIUM
1U	BERYLLIUM	3UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
140000	CALCIUM	36000	SODIUM
5U	CHROMIUM	2UR	THALLIUM
7U	COBALT	NA	TIN
5U	COPPER	4U	VANADIUM
1300J	IRON	50UJ	ZINC
3U	LEAD		
16000	MAGNESIUM		

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51680 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-01 COLLECTION START: 10/16/90 1520 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y138

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1600	ALUMINUM	24	MANGANESE
6.6U	ANTIMONY	0.12U	MERCURY
2UJ	ARSENIC	1.7U	NICKEL
11	BARIUM	160U	POTASSIUM
0.28U	BERYLLIUM	0.55UR	SELENIUM
0.83U	CADMIUM	1.4UJ	SILVER
45000	CALCIUM	280U	SODIUM
4.9	CHROMIUM	0.55U	THALLIUM
1.1U	COBALT	NA	TIN
8UJ	COPPER	5U	VANADIUM
1500J	IRON	30UJ	ZINC
7.1J	LEAD	30	PERCENT MOISTURE
4500	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51681 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-01 COLLECTION START: 10/16/90 1535 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y139

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
4500	ALUMINUM	3U	MANGANESE
5.9U	ANTIMONY	0.11U	MERCURY
2UJ	ARSENIC	2U	NICKEL
20	BARIUM	160U	POTASSIUM
1U	BERYLLIUM	0.47UR	SELENIUM
0.73U	CADMIUM	1.2UJ	SILVER
1900	CALCIUM	60U	SODIUM
7.9	CHROMIUM	0.47U	THALLIUM
0.98U	COBALT	NA	TIN
0.73UJ	COPPER	6U	VANADIUM
4300J	IRON	4UJ	ZINC
4.3J	LEAD	21	PERCENT MOISTURE
240	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51682 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: MW-06 COLLECTION START: 10/16/90 1615 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y143

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
160U	ALUMINUM	7U	MANGANESE
24U	ANTIMONY	0.4UJ	MERCURY
2U	ARSENIC	6U	NICKEL
9U	BARIUM	6400	POTASSIUM
1U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
75000	CALCIUM	29000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
3U	COPPER	3U	VANADIUM
170U	IRON	60UJ	ZINC
8	LEAD		
22000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51683 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-01 COLLECTION START: 10/16/90 1625 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y142

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
36000	ALUMINUM	70U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
14	ARSENIC	18	NICKEL
110	BARIUM	29000	POTASSIUM
2U	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
91000	CALCIUM	28000	SODIUM
78	CHROMIUM	10UR	THALLIUM
7	COBALT	NA	TIN
20U	COPPER	74	VANADIUM
26000J	IRON	60UJ	ZINC
18	LEAD		
20000	MAGNESIUM		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51684 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: PW-01 COLLECTION START: 10/17/90 0935 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y147

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
40U	ALUMINUM	6U	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
2U	ARSENIC	6U	NICKEL
8U	BARIUM	3700	POTASSIUM
1U	BERYLLIUM	2UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
83000	CALCIUM	55000	SODIUM
6U	CHROMIUM	10UR	THALLIUM
4U	COBALT	NA	TIN
20U	COPPER	3U	VANADIUM
390UJ	IRON	40UJ	ZINC
4U	LEAD		
40000	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51685 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL	CITY: PALMETTO ST: FL
STATION ID: SS-02	COLLECTION START: 10/17/90 0925 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER:	MD NUMBER: Y144

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
200	ALUMINUM	19	MANGANESE
5.1U	ANTIMONY	0.10U	MERCURY
1UJ	ARSENIC	1.3U	NICKEL
3U	BARIUM	30U	POTASSIUM
0.21U	BERYLLIUM	0.42UR	SELENIUM
0.63U	CADMIUM	1.1UJ	SILVER
2100	CALCIUM	30U	SODIUM
6.8	CHROMIUM	0.42U	THALLIUM
0.84U	COBALT	NA	TIN
20UJ	COPPER	1U	VANADIUM
300J	IRON	20UJ	ZINC
50J	LEAD	07	PERCENT MOISTURE
180	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51686 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SB-02 COLLECTION START: 10/17/90 0945 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y145

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1100	ALUMINUM	1U	MANGANESE
5.5U	ANTIMONY	0.11U	MERCURY
1UJ	ARSENIC	1.4U	NICKEL
3U	BARIUM	30U	POTASSIUM
0.23U	BERYLLIUM	0.47UR	SELENIUM
0.69U	CADMIUM	1.2UJ	SILVER
130U	CALCIUM	30U	SODIUM
1.4U	CHROMIUM	0.47U	THALLIUM
0.92U	COBALT	NA	TIN
0.69UJ	COPPER	1U	VANADIUM
800J	IRON	4UJ	ZINC
1J	LEAD	19	PERCENT MOISTURE
30U	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

*** ***

** PROJECT NO. 91-025 SAMPLE NO. 51687 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON **
** SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL **
** STATION ID: MW-03 COLLECTION START: 10/17/90 0900 STOP: 00/00/00 **
** CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y328 **
** **

*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
750	ALUMINUM	220	MANGANESE
30U	ANTIMONY	0.20U	MERCURY
30J	ARSENIC	6U	NICKEL
120	BARIUM	9100	POTASSIUM
1U	BERYLLIUM	15UJ	SELENIUM
18	CADMIUM	5UJ	SILVER
380000	CALCIUM	350000	SODIUM
5U	CHROMIUM	10UR	THALLIUM
7U	COBALT	NA	TIN
3U	COPPER	8U	VANADIUM
10000J	IRON	240UJ	ZINC
4U	LEAD		
16000	MAGNESIUM		

REMARKS
HOLDING TIME EXCEEDED-CN

REMARKS

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51688 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SD-10 COLLECTION START: 10/17/90 1045 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y150

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
4400	ALUMINUM	9U	MANGANESE
8.6U	ANTIMONY	0.19U	MERCURY
0.37UR	ARSENIC	4.2	NICKEL
72	BARIUM	550	POTASSIUM
0.36U	BERYLLIUM	3.7UR	SELENIUM
2U	CADMIUM	1.8UJ	SILVER
210000	CALCIUM	3900	SODIUM
24	CHROMIUM	0.74U	THALLIUM
2U	COBALT	NA	TIN
3UJ	COPPER	24	VANADIUM
12000J	IRON	20UJ	ZINC
26J	LEAD	46	PERCENT MOISTURE
510	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51689 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: SS-03 COLLECTION START: 10/17/90 1020 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y148

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
4600	ALUMINUM	10	MANGANESE
5.7U	ANTIMONY	0.12U	MERCURY
2UJ	ARSENIC	5.6	NICKEL
30	BARIUM	420	POTASSIUM
1U	BERYLLIUM	2.4UR	SELENIUM
2.6	CADMIUM	1.2UJ	SILVER
96000	CALCIUM	1800	SODIUM
18	CHROMIUM	0.48U	THALLIUM
2U	COBALT	NA	TIN
4UJ	COPPER	36	VANADIUM
5200J	IRON	20UJ	ZINC
9.5J	LEAD	19	PERCENT MOISTURE
220	MAGNESIUM		

FOOTNOTES
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SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

12/04/90

METALS DATA REPORT

PROJECT NO. 91-025 SAMPLE NO. 51690 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M GORDON
SOURCE: AMAX PHOSPHATE FACIL CITY: PALMETTO ST: FL
STATION ID: TW-02 COLLECTION START: 10/17/90 1040 STOP: 00/00/00
CASE NUMBER: 15099 SAS NUMBER: MD NUMBER: Y146

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
260000	ALUMINUM	70	MANGANESE
24U	ANTIMONY	0.20U	MERCURY
53	ARSENIC	89	NICKEL
460	BARIUM	2900	POTASSIUM
6	BERYLLIUM	10UJ	SELENIUM
3U	CADMIUM	5UJ	SILVER
21000	CALCIUM	2200	SODIUM
190	CHROMIUM	2UR	THALLIUM
32	COBALT		TIN
20U	COPPER	170	VANADIUM
170000J	IRON	130J	ZINC
44	LEAD		
9300	MAGNESIUM		

FOOTNOTES
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U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV, ATHENS, GEORGIA

MEMORANDUM

DATE: NOV 05 1990

SISB/SAS
RECEIVED
NOV 07 1990
EPA - REGION IV
ATLANTA, GA.

SUBJECT: Screening Site Inspection Study Plan, Phase II;
AMAX Phosphate, Palmetto, Manatee County, Florida;
ESD Project No. 91E-009

FROM: Roger E. Carlton, Environmental Engineer
Hazardous Waste Section
Environmental Compliance Branch
Environmental Services Division

TO: Al Hanke, Chief
Site Assessment Section
Waste Programs Branch
Waste Management Division

THRU: William R. Bokey, Chief
Hazardous Waste Section
Environmental Compliance Branch
Environmental Services Division

The Screening Site Inspection Study Plan, Phase II, AMAX Phosphate, Palmetto, Manatee County, Florida, has been reviewed and is complete as is.

If you have any questions, please contact me at (404) 546-3351 or (FTS) 250-3351.

cc: Finger/Wright
Bokey/Hall
Knight
Franklin

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

ENVIRONMENTAL SERVICES DIVISION
ATHENS, GEORGIA 30613

SISB/SAS
RECEIVED
OCT 04 1990
EPA - REGION IV
ATLANTA, GA

MEMORANDUM

DATE: October 3, 1990

SUBJECT: Screening Site Inspection Study Plans

FROM: Pat Stamp Pat Stamp
Laboratory Quality Control Specialist
Laboratory Evaluation & Quality Assurance Section

TO: Al Hanke, Chief
Site Assessment Section
Waste Programs Branch
Waste Management Division

THRU: Wade Knight, Chief WK
Laboratory Evaluation & Quality Assurance Section

We have reviewed the following subject documents and have no comments:

1. Reliable Metal Products, Geneva, Alabama
2. AMAX Phosphate, Palmetto, Florida
3. Georgia Power/Plant Branch, Milledgeville, Georgia
4. Buncombe County Landfill, Asheville, North Carolina
5. 3M Greenville Plant, Greenville, South Carolina
6. Columbia Landfill, Columbia, South Carolina
7. Dart Industries, Hemingway, South Carolina
8. Duracell International Battery, Lancaster, South Carolina
9. G.B. Fermentation, Kingstree, South Carolina
10. Old Lyman Dump, Lyman, South Carolina
11. Old Startex, Spartanburg County Landfill, Startex, SC
12. Richland County Landfill, Columbia, South Carolina
13. Slater Plant Property, Slater, South Carolina

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

SEP 21 1990

4WD-WPB

<u>CERTIFIED MAIL</u>
<u>RETURN RECEIPT REQUEST</u>

Mr. Ivan Nance
Royster Phosphates, Inc.
13300 US Hwy 41 North
Palmetto, Florida 34221

Re: Amax Phosphate - FLD043055151
US Hwy 41 North
Palmetto, Manatee County, Florida

Dear Mr. Nance:

The United States Environmental Protection Agency (EPA), pursuant to the authority and requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA), Public Law 99-499, is planning to conduct an investigation of the above referenced site. EPA has reason to believe that there may be a release or threat of a release of hazardous substances from the site into the surrounding environment. The purpose of the investigation is to determine the nature and extent of contamination at the site and to determine what, if any, further response action would be appropriate.

As per the telephone conversation on September 19, 1990, with you, EPA was granted permission for access to your property beginning on or about October 15, 1990, and continuing through the completion of the investigation on or about October 19, 1990. Activities which maybe conducted during the investigation include:

1. Inspect, sketch and photograph the premises;

2. Collect surface and subsurface soil samples;

3. Collect groundwater and subsurface water samples;

4. Collect sediment samples;

5. Conduct air monitoring;

6. Transportation of equipment onto and about the site as necessary to accomplish the activities above, including trucks and sampling equipment.

The above sampling activity will be conducted by personnel from EPA Region IV's Field Investigation Team (FIT). Dr. Maureen Gordon of FIT will contact you prior to the actual site visit to make final arrangements and note any changes.

Split samples will be made available if requested. However, you will be required to furnish your own containers as well as your own laboratory analyses.

If you have any questions, please contact me at (404) 347-5065. Your cooperation in this matter is appreciated.

Sincerely,

DR

Dorothy L. Rayfield
Florida Project Officer

Enclosure

cc: Eric Nuzie, FDER
K.D. Pass, NUS Corporation

4WD-SAS	4WD-SAS
DR 9-21	NV 9-21
RAYFIELD	VILLAMARZO

DR:AA:DOC ACCESS1/2/3:09/20/90:5065

YELLOW

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

4WD-WPB

Bob Gregor
Site Manager
B&V Waste Science and Technology Corporation
1117 Perimeter Center West
Suite W-212
Atlanta, Georgia 30338

RE: Amax Phosphate Facility
Palmetto, Manatee County, Florida
EPA ID No. FLD043055151
Site Inspection Prioritization

Dear Mr. Gregor:

We have received the Site Inspection Prioritization on Amax Phosphate Facility and have completed a review of the report.

Please find the review comments on the following page.

If you have any questions concerning the review, please do not hesitate to call.

Sincerely yours,

Cynthia K. Gurley

Cynthia K. Gurley
Site Assessment Manager
South Unit

cc: Hubert Wieland, BVWST

AMAX PHOSPHATE FACILITY

REVIEW COMMENTS:

On Figure 2, please write in (Ammonia Removal Pond) beside Treatment Modification. The pond is referred to in the report but not shown on the figures.

Reference 8. Please replace this reference with a better copy. A portion of the page is cut off.

Sign and date References 20 and 21.

Please locate the site on Reference 23.

Address the above comments and finalize this report. Please send 4 complete copies.

ACCESS INFORMATION SHEET

Site Name: AMAX Phosphate
Site Address: Palmetto, Manatee County, Fl.

EPA ID #: FLD043055151

FIT Project Manager: M. Gordon
FIT State Coordinator: KD Pass
EPA Contact: Dorothy Rayfield
Field Date: Week of Oct. 15, 1991
TDD Number:

	File Information	Verification
Facility Owner/Operator Address Phone No. Principal Contact	Royster Phosphates Inc 13300 US Hwy 41 North Palmetto, Fl. 34221 Ivan Nance, Env. (813) 722-4555	
Landowner Address Phone No. Principal Contact (if different from above)		
Date of Information		

Date Access Required (3 weeks prior to field date) ________

Date Information Submitted to EPA ________

Comments:

M.2 - ALIAS/ALIAS LOCATION MAINTENANCE FORM

* ACTION: _ *

SITE: AMAX PHOSPHATE FACILITY

EPA ID: FLD043055151 ALIAS SEQ NO: 01

ALIAS NAME: BORDEN PINEY POINT PHOSPHORIC SOURCE: R * ______ _ *

ALIAS LOCATION * ACTION: _ *

CONTIGUOUS PORTION OF SITE? C FED FAC IND: N * _ _ *

STREET : P O BOX 908 CONG DIST : 10 * ______ __ *

CITY : PALMETTO ST: FL ZIP: 33561 * ______ __ _____-____ *

CNTY NAME: MANATEE CNTY CODE: 081 * ______ ___ *

LATITUDE : 27/31/18.0 LONGITUDE : 082/34/18.0 * __/__/__._ ___/__/__._ *

LL-SOURCE: G LL-ACCURACY: * _ _ *

SMSA : 1140 HYDRO UNIT: 03100202 * ____ ________ *

ALIAS DESCRIPTION:

* ______ *
* ______ *
* ______ *
* ______ *

M.2 - SITE MAINTENANCE FORM

* ACTION: _ *

EPA ID : FLD043055151

SITE NAME: AMAX PHOSPHATE FACILITY SOURCE: S * ____ _ *

STREET : US HWY 41 NORTH CONG DIST: 10 * ____ __ *

CITY : PALMETTO ZIP: 33561 * ____ ____-____ *

CNTY NAME: MANATEE CNTY CODE : 081 * ____ __ *

LATITUDE : 27/31/18.0 LONGITUDE : 082/34/18.0 * __/__/__.__ ___/__/__.__ *

LL-SOURCE: R LL-ACCURACY: * _ _ *

SMSA : 1140 HYDRO UNIT: 03100202 * ____ ________ *

INVENTORY IND: Y REMEDIAL IND: Y REMOVAL IND: N FED FAC IND: N * _ _ _ _ *

NPL IND: N NPL LISTING DATE: NPL DELISTING DATE: * _ __/__ __/__ *

SITE/SPILL IDS: * __ __ __ __ __ *

RPM NAME: RPM PHONE: - - * ____ ___-___-____ *

SITE CLASSIFICATION: SITE APPROACH: * __ __ *

DIOXIN TIER: REG FLD1: REG FLD2: * ____ _____ _ *

RESP TERM: PENDING ( ) NO FURTHER ACTION ( ) * PENDING (_) NO FURTHER ACTION (_) *

ENF DISP: NO VIABLE RESP PARTY ( ) VOLUNTARY RESPONSE ( ) * _ _ *
ENFORCED RESPONSE ( ) COST RECOVERY ( ) * _ _ *

SITE DESCRIPTION:

* ____ *
* ____ *
* ____ *
* ____ *

M.2 - PROGRAM MAINTENANCE FORM

* ACTION: _ *

SITE: AMAX PHOSPHATE FACILITY

EPA ID: FLD043055151 PROGRAM CODE: H01 PROGRAM TYPE: * _ *

PROGRAM QUALIFIER: ALIAS LINK : * ___ __ *

PROGRAM NAME: SITE EVALUATION * ______________________________ *

DESCRIPTION:

* ____ *

* ____ *

* ____ *

* ____ *

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: AMAX PHOSPHATE FACILITY
PROGRAM: SITE EVALUATION

EPA ID: FLD043055151 PROGRAM CODE: H01 EVENT TYPE: DS1

FMS CODE: EVENT QUALIFIER : EVENT LEAD: E * _ ___ _ *

EVENT NAME: DISCOVERY STATUS: * ______________________________ _ *

DESCRIPTION:

* ____ *
* ____ *
* ____ *
* ____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START:	* __/__/__	__/__/__	__/__/__ *
COMP :	COMP :	COMP : 10/01/79	* __/__/__	__/__/__	__/__/__ *

HQ COMMENT:

* ____ *

RG COMMENT:

* ____ *

COOP AGR #	AMENDMENT #	STATUS	STATE %
			0

* __________ __________ __ __ *

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: AMAX PHOSPHATE FACILITY
PROGRAM: SITE EVALUATION

EPA ID: FLD043055151 PROGRAM CODE: H01 EVENT TYPE: PA1

FMS CODE: EVENT QUALIFIER : EVENT LEAD: * _ ___ _ *

EVENT NAME: PRELIMINARY ASSESSMENT STATUS: * ______________________________ _ *

DESCRIPTION:

* ______________________________ *
* ______________________________ *
* ______________________________ *
* ______________________________ *

ORIGINAL	CURRENT	ACTUAL				
START:	START:	START:	*	__/__/__	__/__/__	__/__/__ *
COMP :	COMP :	COMP : 03/01/80	*	__/__/__	__/__/__	__/__/__ *

HQ COMMENT:

* ______________________________ *

RG COMMENT:

* ______________________________ *

COOP AGR #	AMENDMENT #	STATUS	STATE %
			0

* __________ __________ __ __ *

EPA POTENTIAL HAZARDOUS WASTE SITE LOG

SITE NUMBER: 480 ECK

NOTE: The initial identification of a potential site or incident should not be interpreted as a finding of illegal activity or confirmation that an actual health or environmental threat exists. All identified sites will be assessed under the EPA's Hazardous Waste Site Enforcement and Response System to determine if a hazardous waste problem actually exists.

SITE NAME: Borden PINEY POINT PHOSPHORIC PRODUCT

CITY: PALMETTO / HWY US. 41 | STATE: FL | ZIP CODE: 33561

SUMMARY OF POTENTIAL OR KNOWN PROBLEM:
GEN ON SITE, DISPOSAL 1966-1979, IN USE, AMOUNT OF WASTE THRU 1978 IS 10,450,800 TONS. ACID SOLNS, HEAVY + TRACE MTLS INORGANICS. PITS, PONDS, + LAGOON. TREATMENT + RECYCLING.

ITEM	DATE OF DETERMINATION OR COMPLETION	RESPONSIBLE ORGANIZATION OR INDIVIDUAL (EPA, State, Contractor, Other)	PERSON MAKING ENTRY TO LOG FORM	DATE ENTERED ON LOG (mo,day,yr)
1. IDENTIFICATION OF POTENTIAL PROBLEM	11-1-79	ECKHARDT SUBCOMMITTEE	FERRAZZUOLO	11-19-79
2. PRELIMINARY ASSESSMENT	3/3/80	FLDER, Clark	Ferrazzuolo	3/7/80
APPARENT SERIOUSNESS OF PROBLEM: [ ] HIGH [X] MEDIUM [ ] LOW [ ] NONE [ ] UNKNOWN				
3. SITE INSPECTION				
4. EPA TENTATIVE DISPOSITION (check appropriate item(s) below)				
[ ] a. NO ACTION NEEDED				
[ ] b. INVESTIGATIVE ACTION NEEDED				
[ ] c. REMEDIAL ACTION NEEDED				
[ ] d. ENFORCEMENT ACTION NEEDED				
5. EPA FINAL STRATEGY DETERMINATION (check appropriate item(s) below)				
[ ] a. NO ACTION NEEDED				
[ ] b. REMEDIAL ACTION NEEDED				
[ ] c. REMEDIAL ACTION NEEDED BUT, NO RESOURCES AVAILABLE				
[ ] d. ENFORCEMENT ACTION NEEDED				
[ ] (1) CASE DEVELOPMENT PLAN PREPARED				
[ ] (2) ENFORCEMENT CASE FILED OR ADMINISTRATIVE ORDER ISSUED				
6. STRATEGY COMPLETED				

EPA Form T2070-1 (10-79)

Continued From Front

IV. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(*ies*) and details relating to each activity by marking 'X' in the appropriate boxes.

'X' A. TRANSPORTER	'X' B. STORER	'X' C. TREATER	'X' D. DISPOSER
1. RAIL	1. PILE	1. FILTRATION	1. LANDFILL
2. SHIP	2. SURFACE IMPOUNDMENT	2. INCINERATION	2. LANDFARM
3. BARGE	3. DRUMS	3. VOLUME REDUCTION	3. OPEN DUMP
4. TRUCK	4. TANK, ABOVE GROUND	4. RECYCLING/RECOVERY	4. SURFACE IMPOUNDMENT
5. PIPELINE	5. TANK, BELOW GROUND	5. CHEM./PHYS. TREATMENT	5. MIDNIGHT DUMPING
6. OTHER (*specify*):	6. OTHER (*specify*):	6. BIOLOGICAL TREATMENT	6. INCINERATION
		7. WASTE OIL REPROCESSING	7. UNDERGROUND INJECTION
		8. SOLVENT RECOVERY	8. OTHER (*specify*):
		9. OTHER (*specify*):	

E. SPECIFY DETAILS OF SITE ACTIVITIES AS NEEDED

V. WASTE RELATED INFORMATION

A. WASTE TYPE

☐ 1 UNKNOWN ☐ 2. LIQUID ☐ 3. SOLID ☐ 4. SLUDGE ☐ 5. GAS

B. WASTE CHARACTERISTICS

☐ 1. UNKNOWN ☐ 2. CORROSIVE ☐ 3. IGNITABLE ☐ 4 RADIOACTIVE ☐ 5 HIGHLY VOLATILE
☐ 6. TOXIC ☐ 7 REACTIVE ☐ 8. INERT ☐ 9 FLAMMABLE

☐ 10. OTHER (*specify*):

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

2. Estimate the amount(*specify unit of measure*)of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT	AMOUNT	AMOUNT	AMOUNT	AMOUNT	AMOUNT
UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE
'X' (1) PAINT, PIGMENTS	'X' (1) OILY WASTES	'X' (1) HALOGENATED SOLVENTS	'X' (1) ACIDS	'X' (1) FLYASH	'X' (1) LABORATORY PHARMACEUT.
(2) METALS SLUDGES	(2) OTHER(*specify*):	(2) NON-HALOGNTD. SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW		(3) OTHER(*specify*):	(3) CAUSTICS	(3) MILLING/ MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMLTG. WASTES	(4) MUNICIPAL
(5) OTHER(*specify*):			(5) DYES/INKS	(5) NON-FERROUS SMLTG. WASTES	(5) OTHER(*specify*):
			(6) CYANIDE	(6) OTHER(*specify*):	
			(7) PHENOLS		
			(8) HALOGENS		
			(9) PCB		
			(10) METALS		
			(11) OTHER(*specify*)		

 Continue On Page 3

EPA

POTENTIAL HAZARDOUS WASTE SITE IDENTIFICATION AND PRELIMINARY ASSESSMENT

REGION: IV

SITE NUMBER (to be assigned by Hq):

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The information submitted on this form is based on available records and may be updated on subsequent forms as a result of additional inquiries and on-site inspections.

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely as possible before Section II (Preliminary Assessment). File this form in the Regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: PineyPoint Phosphate Product

B. STREET (or other identifier): US 41 P.O. Box 790

C. CITY: ~~Plant City~~ Palmetto

D. STATE: Fla

E. ZIP CODE: 33560

F. COUNTY NAME: Manatee

G. OWNER/OPERATOR (if known)

1. NAME: J. W. Smith Plant Manager (Borden, Inc)

2. TELEPHONE NUMBER: 813/722-4555

H. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4 MUNICIPAL ☒ 5 PRIVATE ☐ 6 UNKNOWN

I. SITE DESCRIPTION

J. HOW IDENTIFIED (i.e., citizen's complaints, OSHA citations, etc.): Eckhardt Report #480

K. DATE IDENTIFIED (mo., day, & yr.): Oct 1979

L. PRINCIPAL STATE CONTACT

1. NAME: Robert Hawfield

2. TELEPHONE NUMBER: 904/488-0300

II. PRELIMINARY ASSESSMENT (complete this section last)

A. APPARENT SERIOUSNESS OF PROBLEM

☐ 1. HIGH ☒ 2. MEDIUM ☐ 3. LOW ☐ 4 NONE ☐ 5. UNKNOWN

B. RECOMMENDATION

☐ 1. NO ACTION NEEDED (no hazard)

☐ 2. IMMEDIATE SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

☒ 3. SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:

☐ 4. SITE INSPECTION NEEDED (low priority)

Pending further EPA/DER Study

C. PREPARER INFORMATION

1. NAME: Robert Clark

2. TELEPHONE NUMBER: 813/985-7402

3. DATE (mo., day, & yr.): 3/3/80

III. SITE INFORMATION

A. SITE STATUS

☒ 1. ACTIVE (Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)

☐ 2. INACTIVE (Those sites which no longer receive wastes.)

☐ 3. OTHER (specify): (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)

B. IS GENERATOR ON SITE?

☐ 1. NO ☒ 2. YES (specify generator's four-digit SIC Code): 2874

C. AREA OF SITE (in acres)

D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES

1. LATITUDE (deg.—min.—sec.)

2. LONGITUDE (deg.—min.—sec.)

E. ARE THERE BUILDINGS ON THE SITE?

☐ 1. NO ☐ 2. YES (specify):

T2070-2 (10-79)

Continue On Reverse

Continued From Page 2

V. WASTE RELATED INFORMATION (continued)

3. LIST SUBSTANCES OF GREATEST CONCERN WHICH MAY BE ON THE SITE *(place in descending order of hazard)*.

4. ADDITIONAL COMMENTS OR NARRATIVE DESCRIPTION OF SITUATION KNOWN OR REPORTED TO EXIST AT THE SITE.

VI. HAZARD DESCRIPTION

A. TYPE OF HAZARD	B. POTENTIAL HAZARD *(mark 'X')*	C. ALLEGED INCIDENT *(mark 'X')*	D. DATE OF INCIDENT *(mo., day, yr.)*	E. REMARKS
1. NO HAZARD				
2. HUMAN HEALTH				
3. NON-WORKER INJURY/EXPOSURE				
4. WORKER INJURY				
5. CONTAMINATION OF WATER SUPPLY				
6. CONTAMINATION OF FOOD CHAIN				
7. CONTAMINATION OF GROUND WATER				
8. CONTAMINATION OF SURFACE WATER				
9. DAMAGE TO FLORA/FAUNA				
10. FISH KILL				
11. CONTAMINATION OF AIR				
12. NOTICEABLE ODORS				
13. CONTAMINATION OF SOIL				
14. PROPERTY DAMAGE				
15. FIRE OR EXPLOSION				
16. SPILLS/LEAKING CONTAINERS/ RUNOFF/STANDING LIQUIDS				
17. SEWER, STORM DRAIN PROBLEMS				
18. EROSION PROBLEMS				
19. INADEQUATE SECURITY				
20. INCOMPATIBLE WASTES				
21. MIDNIGHT DUMPING				
22. OTHER *(specify)*:				

Continue On Reverse

Continued From Front

VII. PERMIT INFORMATION

A. INDICATE ALL APPLICABLE PERMITS HELD BY THE SITE.

☐ 1. NPDES PERMIT ☐ 2 SPCC PLAN ☐ 3. STATE PERMIT *(specify)*: ____

☐ 4. AIR PERMITS ☐ 5. LOCAL PERMIT ☐ 6. RCRA TRANSPORTER

☐ 7 RCRA STORER ☐ 8. RCRA TREATER ☐ 9 RCRA DISPOSER

☐ 10. OTHER *(specify)*: ____

B. IN COMPLIANCE?

☐ 1. YES ☐ 2. NO ☐ 3. UNKNOWN

4. WITH RESPECT TO *(list regulation name & number)*: ____

VIII. PAST REGULATORY ACTIONS

☐ A. NONE ☐ B. YES *(summarize below)*

IX. INSPECTION ACTIVITY *(past or on-going)*

☐ A NONE ☐ B. YES *(complete items 1,2,3, & 4 below)*

1. TYPE OF ACTIVITY	2 DATE OF PAST ACTION (mo., day, & yr.)	3 PERFORMED BY: (EPA/State)	4. DESCRIPTION

X. REMEDIAL ACTIVITY *(past or on-going)*

☐ A. NONE ☐ B. YES *(complete items 1, 2, 3, & 4 below)*

1. TYPE OF ACTIVITY	2. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION

NOTE: Based on the information in Sections III through X, fill out the Preliminary Assessment *(Section II)* information on the first page of this form.

U . S . EPA REGION IV

SDMS

Unscannable Material Target Sheet

DocID: 10079029 Site ID: FLD043055181

Site Name: Hew Site

Nature of Material:

Map:	✓	Computer Disks:	
Photos:		CD-ROM:	
Blueprints:		Oversized Report:	
Slides:		Log Book:	

Other (describe):

Amount of material: (1)

Please contact the appropriate Records Center to view the material.